Design Engineering.

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80 ideas shaping the future...

JUL 77

1958 Vol. 4 # 7-12

JULY 1958

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"*Light...strong...non-staining!*

That's a combination I need for MY business."

Aluminum is showing up everywhere these days. Aluminum nails, for example, are being used more and more for lasting good looks. They eliminate the problem of unsightly streaks on buildings and fences. The ever widening use of this versatile metal has been made possible by the development of new alloys, improved fabricating and welding techniques, consumer demand and ALCAN "know how".

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80 ideas shaping the future...

Design Engineering

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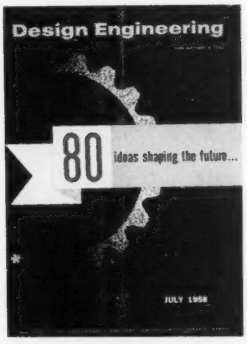

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The story behind this issue

Very early in the year, the complete staff of Design Engineering squeezed into the editor's office to discuss this July issue. Result of the brainstorming session was a plan for a presentation which would give to our readers what we considered were the 80 top ideas shaping the future in the field of Design Engineering. The number chosen was not significant in itself, but indicated that, rather than publish every new product release we could lay hands on, we were determined to be selective. This way, the issue would be of real value.

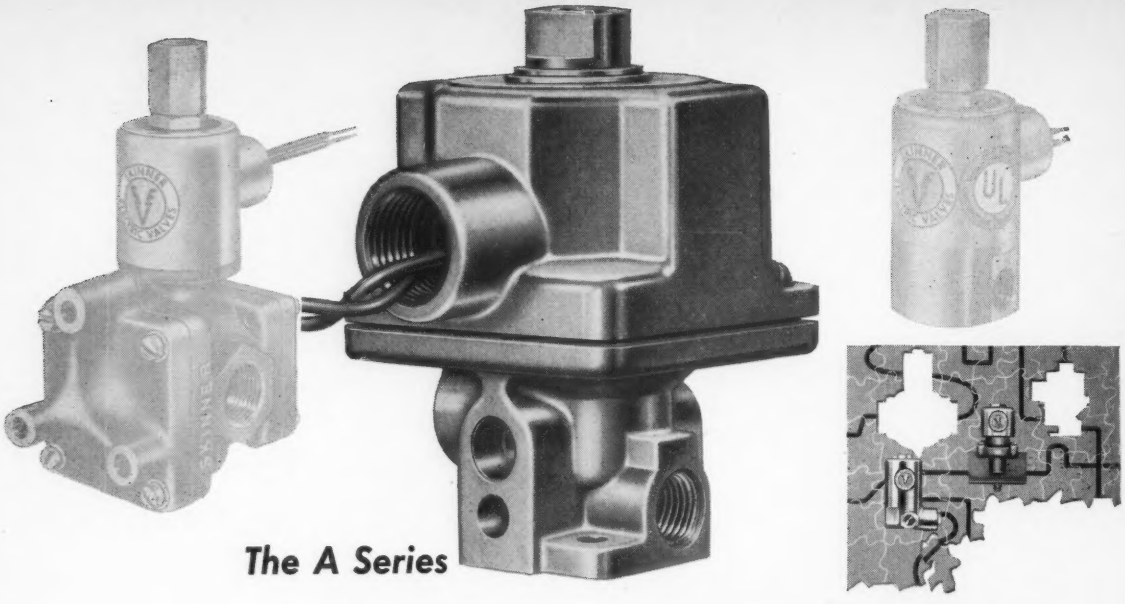
Mailings from Design Engineering soon followed. Manufacturers and suppliers were both enthusiastic and helpful. In all, we assembled more than 300 special entries for the issue and, wishing at times that the editorial neck hadn't been stuck out so far, sat down to the long process of selection and editing. The results of our labors are here for you to see.

We would like to thank all those who sent contributions to the issue and repeat that the job of selection has been a difficult one. There were many excellent ideas that, due to our top limit of 80 and lack of space, had to be left out.

The items that were selected and appear here are in no order of merit nor do they appear alphabetically. Once reaching the select group of 80, they were then assembled in the sequence most suitable from the layout point of view.

The July issue of last year was our first attempt at this type of presentation. We think that this year's is not only easier to read, but more likely to be a help to you. Any comments you have on the issue — suggestions for improvements we can make — will be welcomed and, wherever practical, incorporated into our July 1959 issue.

This month the Reader Service Card toward the back of the book plays an even more important part than usual. The system for using the two prestamped and preaddressed cards is nevertheless the same. To get fuller information on any of the items in this **Idea** issue, find the Reader Service Card number at the end of its write-up and circle the same number on one of the cards. We pass your requests to the manufacturers and they send full details direct to you. Don't forget to fill in your name and address before heading for the mailbox.



The A Series

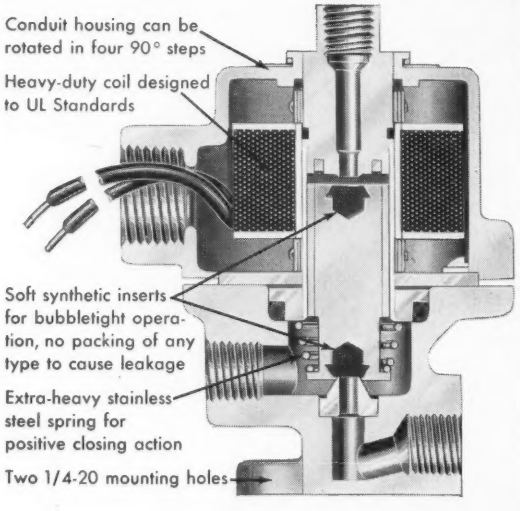
NEW— three-way Skinner Valve line for medium-size cylinders

This new A Series valve line bridges the gap between the famous V5 line used with small cylinders and the reliable M3 line used with large cylinders. The design of this new line permits economical and efficient operation of medium-size cylinders as well as faster operation of smaller cylinders where increased cycling speed is a necessity.

The first of the A Series line is a 3-way normally closed valve with a $\frac{5}{32}$" orifice and $\frac{1}{4}$" NPT ports, and a pressure rating of 125 PSI. It is designed for use with such media as oil, air and inert gases.

Despite the increase in capacity, this new valve is light in weight (only 3 pounds) and compact ($3\frac{7}{8}$" high and $2\frac{5}{8}$" square). The body and mounting are non-corrosive zinc and the internal parts are stainless steel. The plunger is spring-loaded and direct-acting, and the valve can be mounted in any position. Soft synthetic inserts are used, assuring bubbletight operation and long, trouble-free life.

For additional information, options and specifications, call the Skinner Representative or Distributor nearest you – he's listed in the Yellow Pages. Or write us at the address below, Dept. 357.


Conduit housing can be rotated in four 90° steps
Heavy-duty coil designed to UL Standards
Soft synthetic inserts for bubbletight operation, no packing of any type to cause leakage
Extra-heavy stainless steel spring for positive closing action
Two 1/4-20 mounting holes

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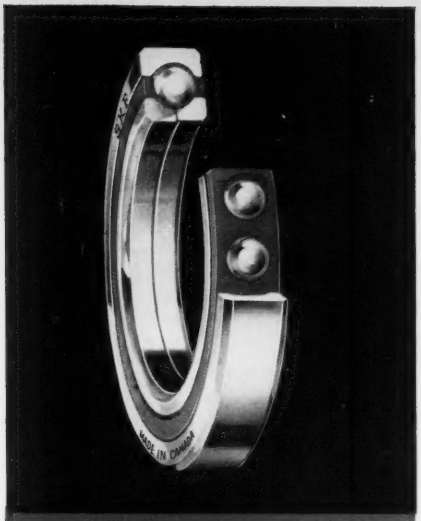
105 EDGEWOOD AVENUE

in step

with man's

PROGRESS



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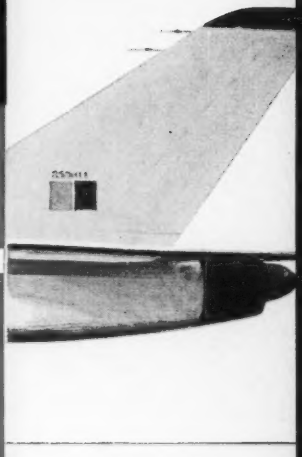

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for lasting beauty,

low-cost maintenance

and long life

As an architectural material, nickel-containing stainless steel has decided advantages over other materials. It has a rich silvery lustre that produces strikingly beautiful effects when combined with wood, glass and enamelled surfaces. The smooth surface is easy to keep clean. It needs no periodic painting, polishing, lacquering or waxing and no special cleaning compounds. It is corrosion resistant and extremely strong, tough and durable. Withstands severe abuse . . . won't crack, chip, pit, rust or deteriorate.

Nickel helps give stainless steel its exceptional strength and its resistance to corrosion . . . makes it easy to fabricate. Specify nickel-containing stainless steel for interior and exterior applications in building or remodelling. We will be pleased to supply additional information on the use of stainless steel as an architectural material.

Striking architectural effects can be achieved as illustrated in the nickel-containing stainless steel elevator doors, entrance and operating panel in a new Montreal building.

In the Toronto Subway, stair rails, entrance barriers, ticket booths and door frames made of nickel-containing stainless steel add bright beauty and insure lasting, low-cost service.

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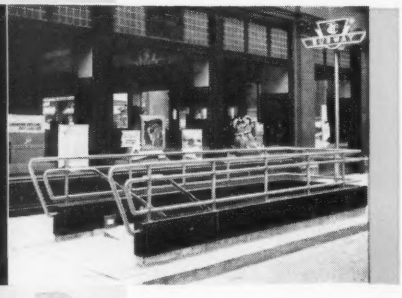
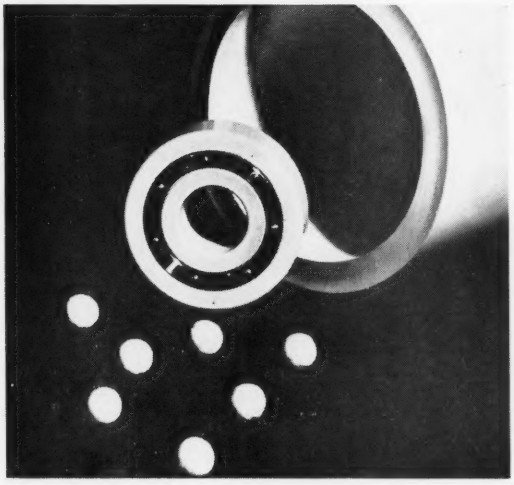
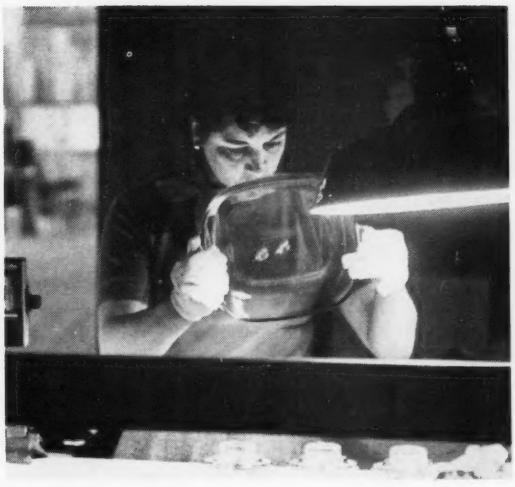


Stainless steel doors, railings and trim provide a handsome weather-resistant entrance to the Food Products Building at the C.N.E.

Department stores, offices, banks and small shops with nickel-containing stainless steel entrance-ways have a permanently attractive and inviting appearance.

Ceramics: ideal properties for bearings





Introduced in May 1957 by **Corning Glass Works,** Pyroceram is essentially a material that has been converted (by heat treatment) from its original glassy state to an opaque, crystalline ceramic. It is stronger and harder than the parent glass, has greater scratch and impact abrasion resistance, and is characterized by improved thermal and electrical properties.

Pyroceram Code 9606 was formulated to produce a hard, abrasion-resistant end product with excellent electrical properties. However, other desirable properties — high strength, hardness and abrasion resistance — make it suitable for uses in other fields.

It can be ground and polished in its glassy and crystalline states by conventional finishing processes.

In color it ranges from an off-white to cream. It is non-porous and shows no increase in weight after long submersion in water.

It is now in commercial production for tubing, rod and plate. Its strength, hardness and formability make it ideal for bearings. Tests show in fact, that these bearings will operate at temperatures in excess of 1,000 F without lubrication. They will withstand loads up to 50% of those of stainless steel bearings.

Other applications are for high temperature heat exchanger tubing, precision-made aircraft structural parts, brake shoes, bulkheads for nuclear surface vessels and low expansion piston heads.

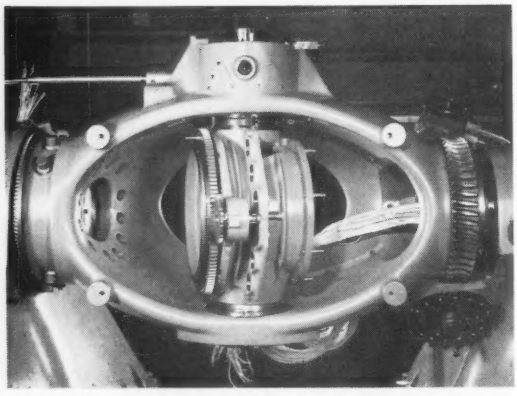
Pyroceram Code 9608 can be formed into any conventional glass shape. Such objects as flasks, beakers, evaporation dishes and other laboratory equipment can be made; such varied pieces as cylinders, godet wheels, pump parts, pipe caps, thread guides and globes have been made, thus providing evidence of its versatility in forming. (200)

Comparison of Mechanical Properties

	Pyroceram		Glass		Ceramic
	Code 9606	Code 9608	Code 7900	Code 7740	High purity aluminas
Modulus of elasticity (psi x 10^{-6})	17.3	12.5	9.6	9.5	40
Poisson's ratio	0.245	0.25	0.17	0.20	0.32
Modulus of Rupture (psi x 10^{-3})	20	16 to 23	5.9	6 to 10	40 to 50
Hardness Knoop 100 gm	698	703	532	481	1880
500 gm	619	588	477	442	1530

Flight simulator: maximum stiffness-to-inertia ratio

The flight table on the **Bendix** 3-dimensional Flight Simulator consists of a three-gimbal assembly mounted on a rigid, fork-type pedestal supported on a massive, vibration-absorbing base. All movable support members have been designed for a maximum stiffness-to-inertia ratio to improve the problem accuracy.



Each of the three axes consists principally of a high performance servo valve controlling the hydraulic motor, precision gears and gimbal. A rotary hydraulic joint and electrical slip-ring assembly on each axis allows transmission of hydraulic power, electrical power and signals without restricting the rotation of the gimbal.

The pitch (or outer) gimbal shown (defined as the Y axis) is an ellipsoid-shaped structure using the Al-Fin aluminum casting process. Steel bearing inserts are bonded into the casting as an integral part. (Bond strength is 15,000 psi tension; 7,000 psi shear.)

The pitch gimbal is the largest of the dynamic structural elements. Its torsional spring rate is approximately 174×10^6 lb-in/rad. The unloaded moment of inertia is approximately 11 lb-in-sec^2. The net inertia of the entire unloaded gimbal structure is 58 lb-in-sec^2.

Continuous rotation is possible when the load envelope is kept within the limits of each gimbal. (201)

Lantern: utility and high style

For the first time, Canadian dry batteries have gone high-fashion. Pace-setter for the industry is **Burgess Battery Company** who are introducing modern design and color to the battery-base of their Radar-Lamp, a portable utility lantern for home use, sports and outdoor living.

Reflecting the trend toward appliances and utensils that are both beautiful and practical, Burgess assigned a leading industrial designer, Robert Sidney Dickens, to put Radar-Lamp's double-powered, unitized battery-and-case in contemporary dress. Their combined talents have transformed this novel dry battery lantern into a handsome piece of utility equipment.

Underneath the new design is the newly engineered, twin-powered battery incorporating two 6 volt lantern batteries wired in parallel, providing up to four times the life of an ordinary lantern's single battery. The battery is completely self-contained and eliminates the separate battery case of conventional lanterns. Two simple insulated screw caps attach the lighthead to the steel-encased battery, thus eliminating complex wiring and spring contacts. Waterproof and weatherproof, the Radar-Lamp is engineered to undergo rugged outdoor living, all-year-round sports and utility use. It is completely safe and ideal for children's use. (202)

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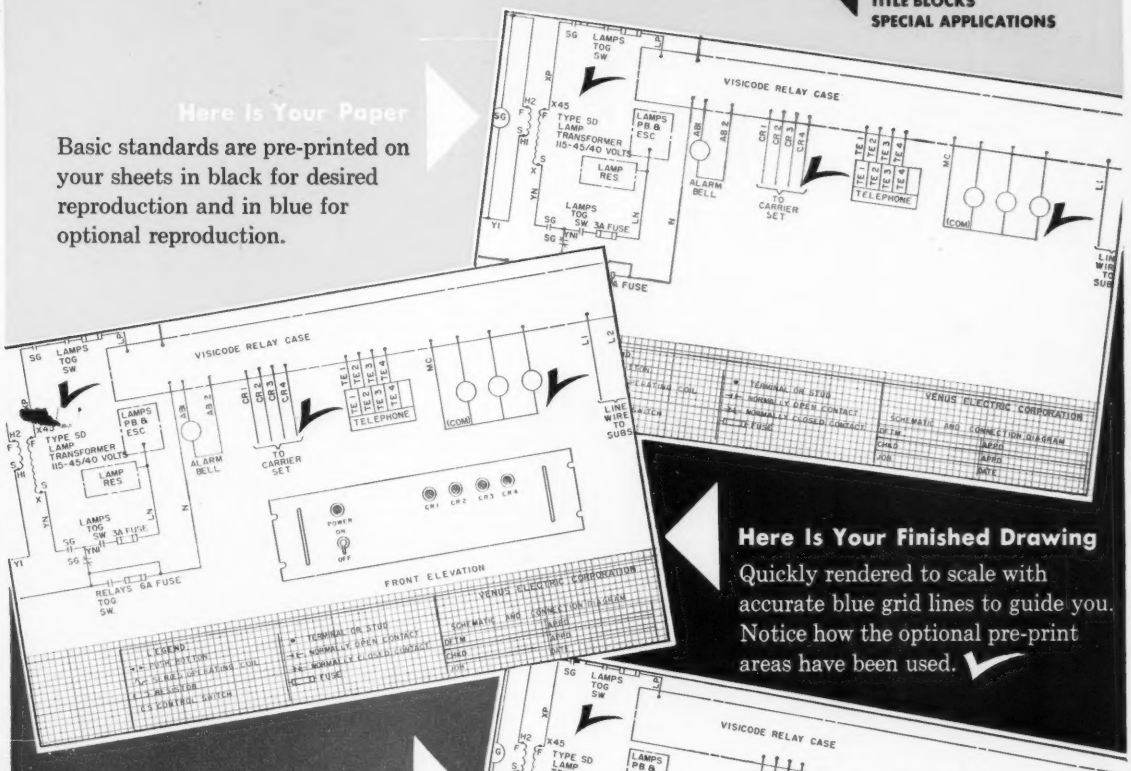

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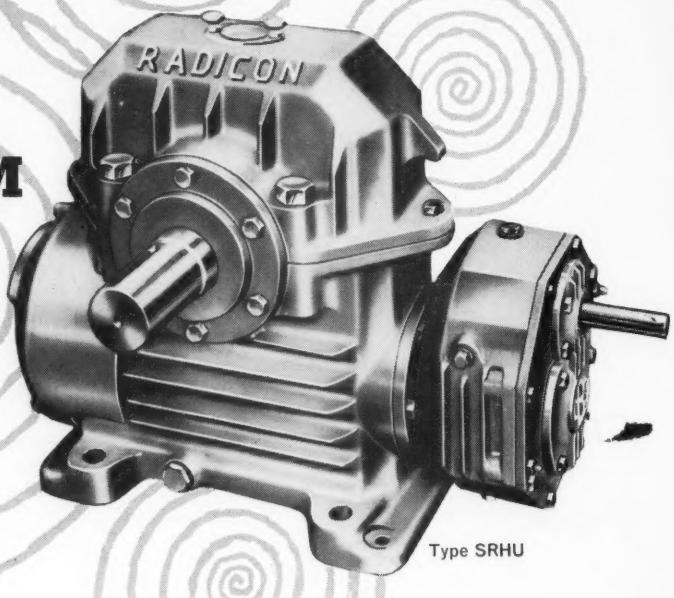

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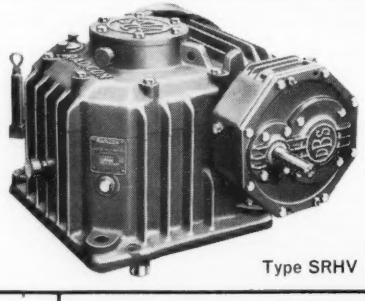
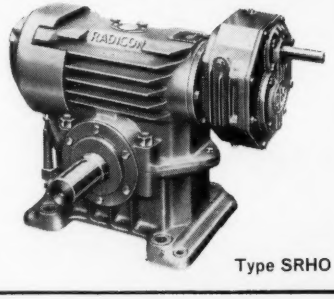
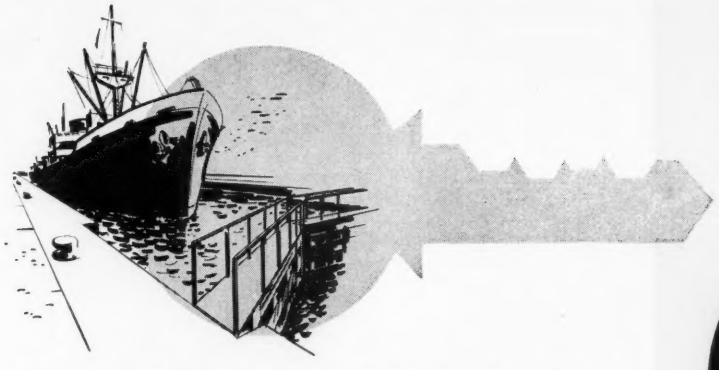


Type SRHV



Type SRHO

RUBBER KEY TO LOCK CONTROL ON THE SEAWAY!



Imagine, if you will, the complexity of specifications for such a rubber gate seal. Imagine the pressure of water . . . the weight and size of the lock gate . . . the extremes of climate . . . and the terrific and repeated abrasion of rubber on concrete. Yet, we compounded and moulded these 50-foot long, 230-pound rubber gate seals to answer *every* specification.

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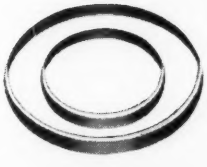

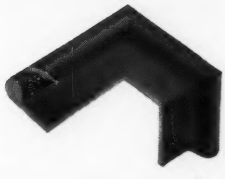

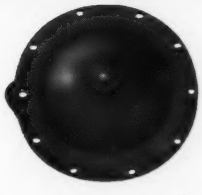

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With the most complete range of presses in the country, Dominion Rubber has the facilities *plus the experience* necessary to mould the smallest of precision parts to the largest, regardless of intricacy of shape. Dominion Rubber expertly moulds engineered rubber parts to meet all chemical and physical requirements. Dominion Rubber can combine rubber with rubber, rubber with fabric, rubber with metal and other combinations required by industry.

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designed to save you material, machining and labor costs

basic types

BASIC

#5000 *(internal)*

#5100 *(external)*

Tapered design principle permits rings to maintain constant circularity and pressure against bottom of groove.

INVERTED

#5008 *(internal)*

#5108 *(external)*

Inverted construction provides uniform protruding shoulders while maintaining constant circularity when installed in groove.

for taking up end-play

BOWED

#5001 *(internal)*

#5101 *(external)*

Bowed construction permits **resilient** take-up of end-play.

BEVELED

#5002 *(internal)*

#5102 *(external)*

Beveled construction permits **rigid** take-up of end-play.

for radial assembly

E-RING

#5133
#5131 *(bowed)*

Radially applied. Provides large shoulder on small shaft diameter. Bowed version provides take-up of end-play.

CRESCENT

#5103 *(external)*

Applied radially over shaft. Secure against impact and vibration.

INTERLOCKING

#5107 *(external)*

Two-piece ring applied radially. Secure against extremely high r.p.m.'s and heavy thrusts.

self-locking types

CIRCULAR SELF-LOCKING

#5005 *(internal)*

#5105 *(external)*

Installed axially. Requires no groove. Recommended for permanent assemblies exposed to relatively moderate thrusts, impacts or vibrational loading.

TRIANGULAR SELF-LOCKING

#5305 *(external)*

Low cost retainer. Makes possible tight assemblies free of end-play on relatively soft shafts.

TRIANGULAR NUT

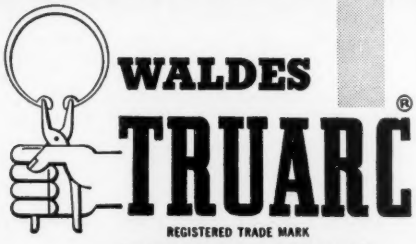
#5300 *(external)*

Flattens under torque. Secures equal load distribution. Replaces lock washer on screw.

GRIP-RING

#5555 *(external)*

Applied axially on shaft. Requires no groove. Exerts considerable frictional hold against axial displacement.



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Wrap a fully cured tape of this new silicone rubber around a cable . . . in a short time it fuses into a homogeneous mass! Press a molded or extruded piece of this rubber into position and it will stay firmly in place. From research at UNION CARBIDE, the Silicones Man brings you the world's first *fusible*, silicone rubber.

This new product has all the properties usually associated with premium silicone rubber . . . outstanding high temperature performance, good electrical and oil resistance, excellent reversion resistance among them. You can well imagine the many applications in electronics gear, high temperature locations . . . how assembly work will be speeded by "press-in-place" construction. Here is another example of how the specialized knowledge of the Silicones Man has helped solve an "impossible" problem.

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INVENTED THE FIRST BICYCLE
WITH PEDALS, IN SCHWEINFURT
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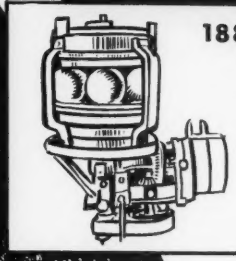

75 YEARS AGO
FRIEDRICH **FISCHER**
PRODUCED THE FIRST STEEL
BALLS BY AN AUTOMATIC PROCESS
HE WAS SOON KNOWN AS **KUGELFISCHER**
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Manufactured and marketed universally
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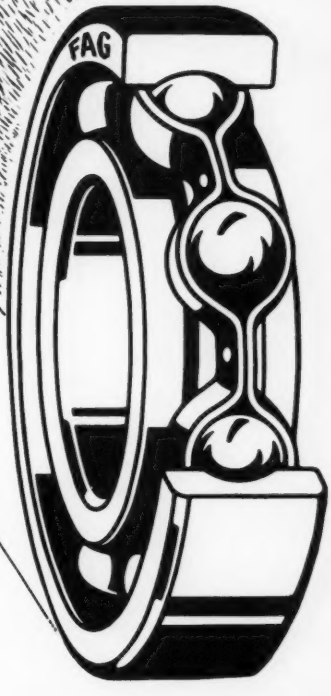

SINCE **FISCHER** FOUNDED
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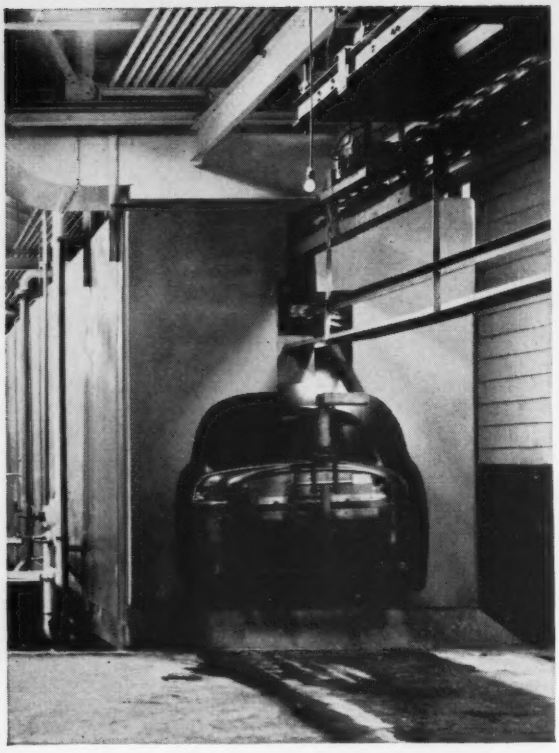
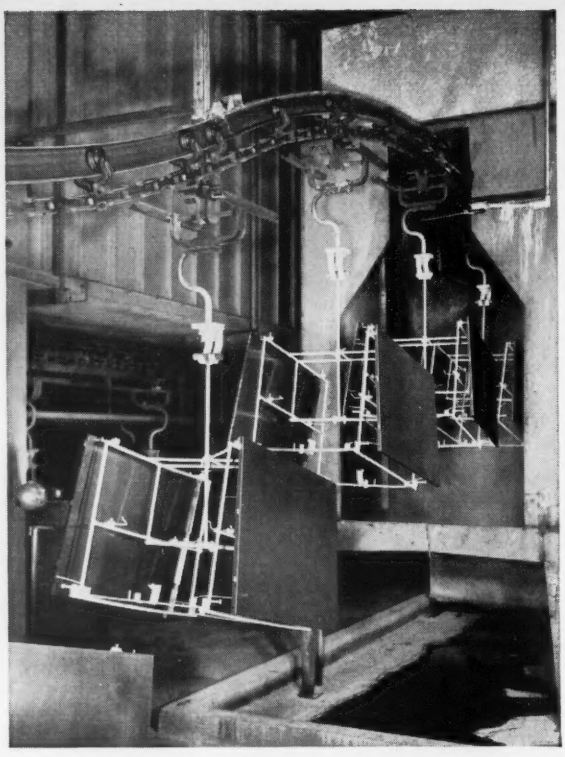


BODY LINES save up to 10 to 12¢ per body



APPLIANCE LINES save up to 4 to 5¢ per cabinet

New Parker COLD BONDERITE SYSTEM slashes steam costs!

Want to save up to 70% of heating costs on your phosphate coating line? Put in the amazing Cold Bonderite System, newly developed for low temperature operation.

It includes a new cold alkaline cleaner, specially developed to remove grease and soil through an effective temperature range of 60° to 120°. A new Spra-Bonderite works in conjunction with the cold cleaner, producing excellent coatings at low temperatures. B.T.U. requirements are drastically reduced, with no sacrifice in quality.

Chemical costs of the new Cold Bonderite System just about match conventional cleaner and phosphating materials. Operation and control are simple as can be.

New Cold Bonderite System is at work right now—has been for months—in several famous production plants. It's a *proven* money-saver!

Find out how much Cold Bonderite System will cut *your* phosphate line heat costs. Write or call for complete information.

Since 1914—leader in the field

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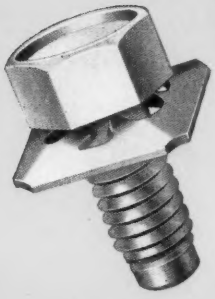
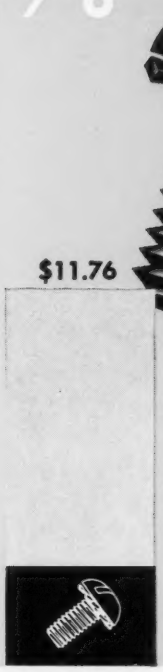
BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

HOW TO CUT YOUR ASSEMBLY COSTS 36%





Ordinary Small Screw and Loose Lock Washer
$2.02 PER M

Sems, Pre-Assembled Screw and Lock Washer
$3.01 PER M

SEMS-by-SHAKEPROOF, mechanically pre-assembled washers and screws, eliminate separate washer handling on the production line . . . save you time and money. Here's proof:

The total cost of using separate washers and screws averages $18.36 per thousand, as the above chart shows. Switching to Sems reduces the labor and burden cost substantially, since hand assembly of washer and screw is eliminated. This brings down the total fastening cost to $11.76—a savings of 36%—even though pre-assembled Sems are priced slightly higher.

Even greater cost-savings result in the use of special Sems. Among the many types available are: high-strength Dished and Domed lock washer Sems; Countersunk lock washer Sems; fiber, asbestos or rubber washer Sems; Flat and Conical washer Sems; 3-piece terminal-clamp Sems; mastic sealing Sems; and a large variety of special washer and screw combinations.

Shakeproof recently concluded an analysis of fastening applications showing that the price of common fasteners is only 19% of the total cost, while labor and burden required to "install" the fasteners represent 81% of the total cost. This study proves that greater savings can be made with labor-saving fasteners than with fasteners purchased on the basis of lowest price per thousand.

To learn more about this concept of assembly savings, write for the Shakeproof "Price-Per-Thousand" booklet.

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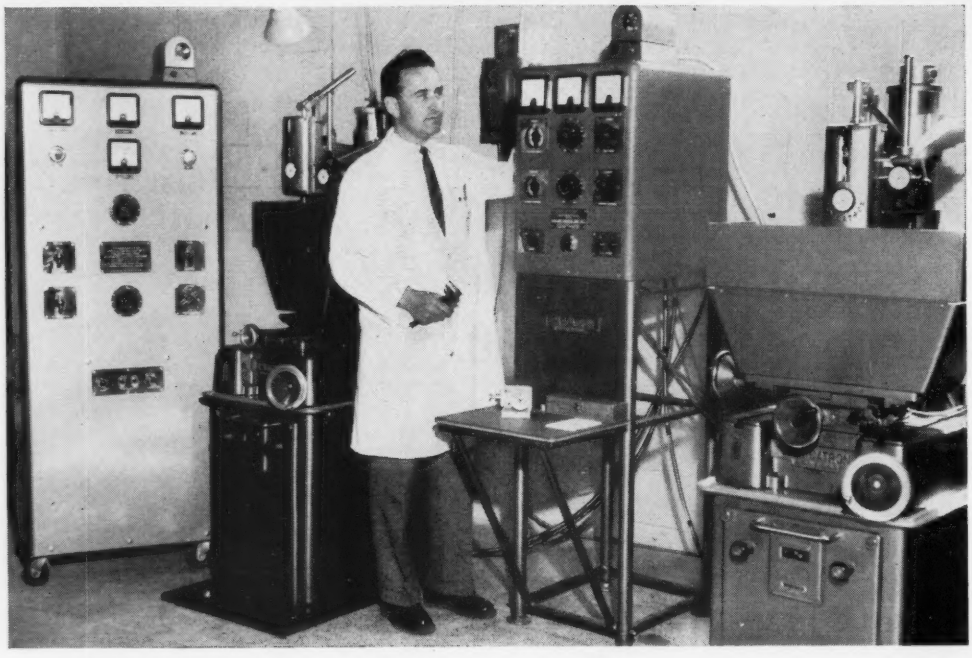

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HEAVY DUTY ELECTRO-EROSION MACHINE SIMPLIFIES COMPLEX DIE MANUFACTURE.

BATTERIES OF UP TO FOUR SERVO HEADS CAN BE WORKED FROM ONE SPARCATRON MAIN CONTROL UNIT.

AT OUR TORONTO PLANT, WE SHALL BE GLAD TO DEMONSTRATE THE COST-SAVING FEATURES OF THE AMAZING SPARCATRON MK. 111

The most advanced method of cutting intricate shapes, profiles, forms or impressions in hard and soft current-conducting materials.

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Special adaptations of the SPARCATRON MK. III can be built to customers' requirements.

SPARCATRON...
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UNI-RING offers a tremendous saving in installation time over any previous method of tapping or terminating shielded or coaxial cable. As the inner ring slides under the shielded braid, the tap wire is held between the braid and the outer ring. Single or multiple taps, from either the front or back of the connector, can be accommodated . . . A single crimp, using the same basic HYTOOLS used for installing HYRINGS, completes the uniform, secure, and insulated assembly.

The protecting nylon insulation extends beyond both ends of the UNI-RING, eliminating metal-to-metal contact and preventing harmful wire-chafing in tight locations. The UNI-RING is color-coded to indicate conductor sizes.

UNI-RING's one-piece design insures electrical integrity, prevents heating, and eliminates noises caused by isolated metal parts.

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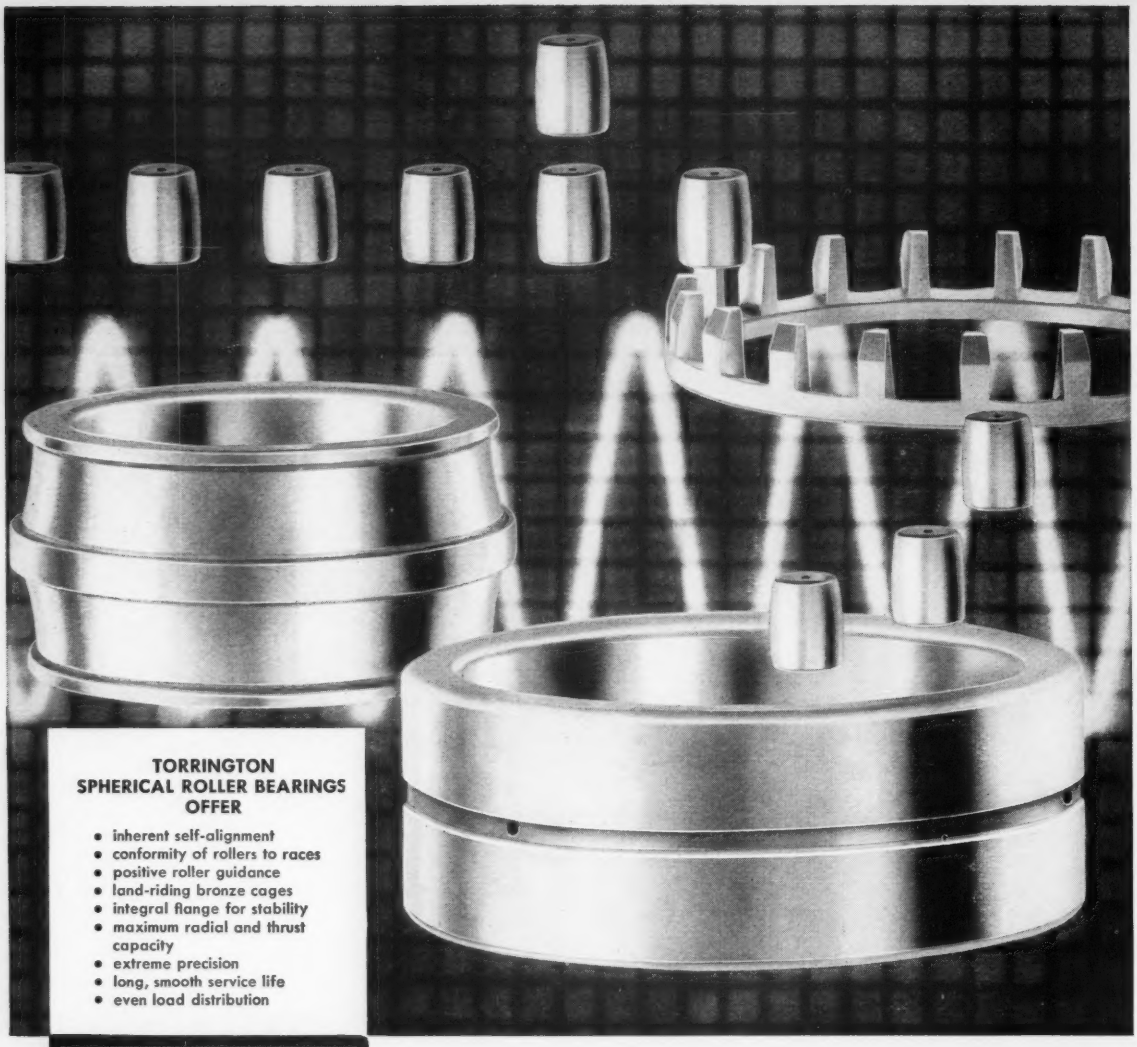

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- long, smooth service life
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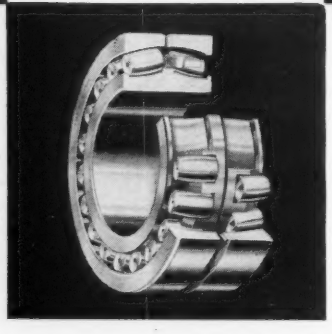

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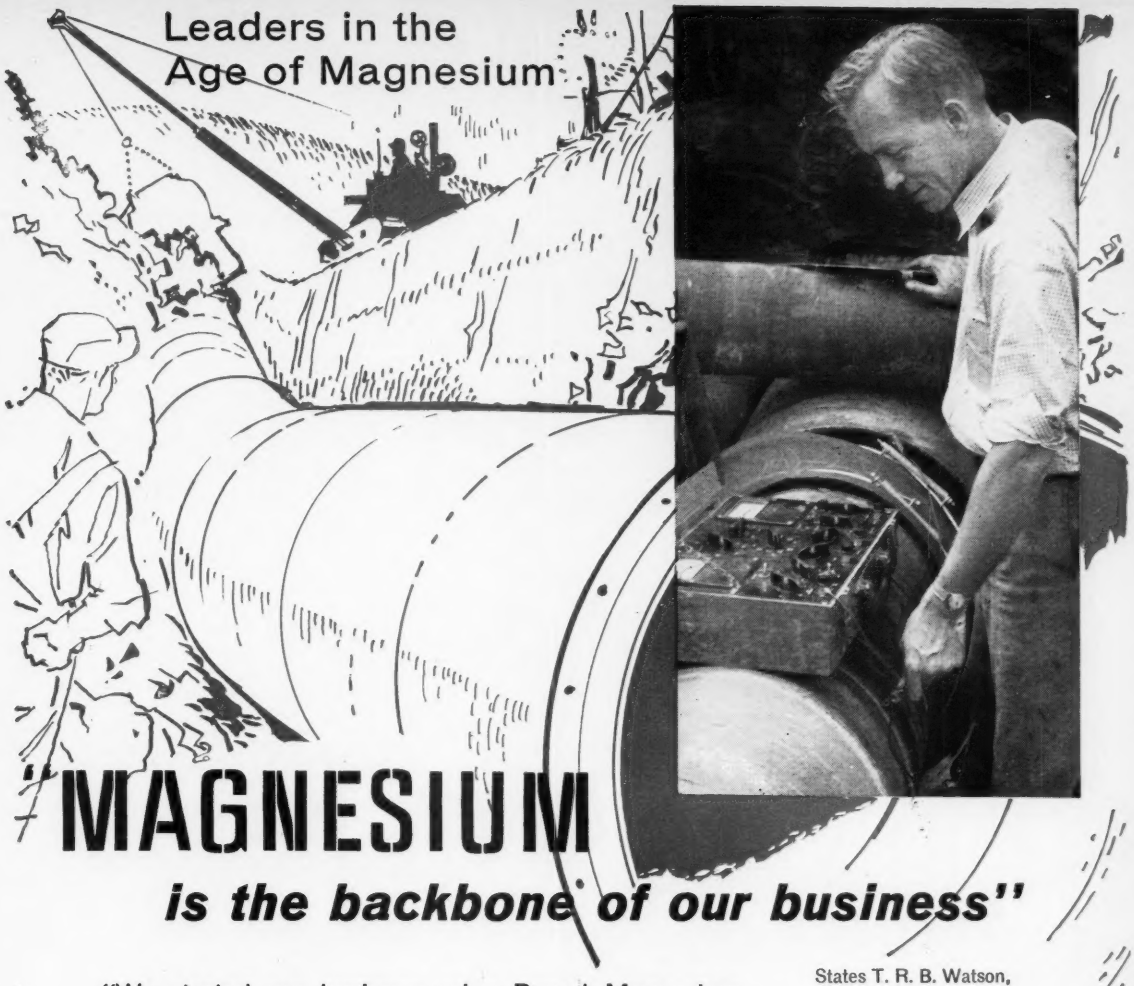

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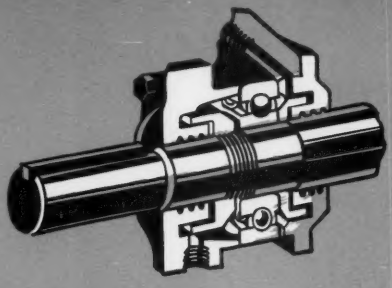
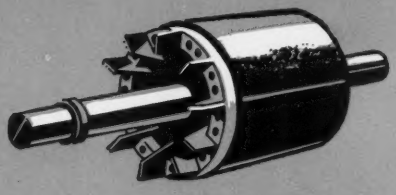
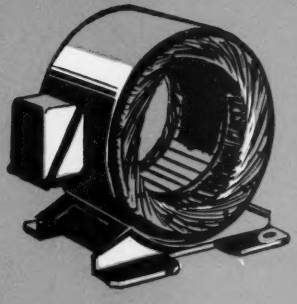
1 to 5 H.P. Polyphase Motors
(Frames 182, 184, 213 and 215)



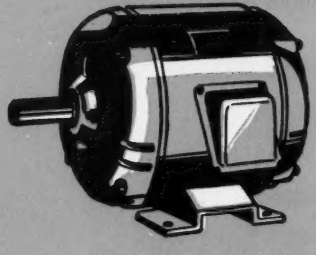
The revolutionary Wagner Transverse System of lubrication assures efficient lubrication under any and all operating conditions. When desired, all the "old" grease is transversely ejected and fresh, clean grease replaces it.



The new Wagner Motors are cool running. This means longer life—greater dependability. The blower blades form an integral part of the pressure cast rotor allowing unimpeded heat transfer. On larger ratings auxiliary fans provide additional cooling.



Wagner Motors keep operating under extreme conditions. The modern materials used for winding insulation have been time-tested *and* proven *in thousands of applications. Chief among these materials is MYLAR (Du Pont trademark) used for slot liner insulation.*



The newly designed Wagner Polyphase Motors have a smaller, more rugged frame that effectively resists distortion. The heavy steel frames, retaining the same material thickness as in the previous larger frames, add greatly to the rigidity. Built to C.E.M.A. standard mounting dimensions.

For the ultimate in dependability, specify Wagner. G-5876

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Canada Iron manufactures all grades and types of cast iron, for convenience classified as follows and complying fully with A.S.T.M. A48 where applicable. Here are some typical examples:

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DOMITE "40": High strength, medium cross-section. Minimum tensile strength 40,000 psi. Typical Brinell hardness 235.

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DOMITE WEAR RESISTING: Type WR—A, B, C and D (type depending on service involved).

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NI-HARD: Alloyed white iron, Brinell 600-725.

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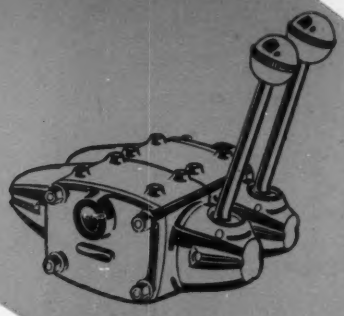

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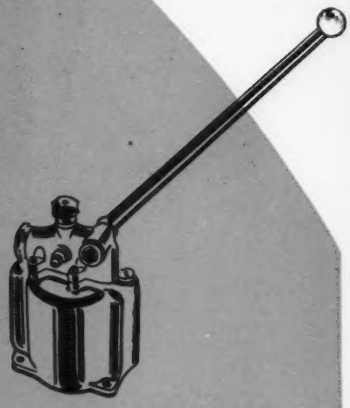
Easy to stack for series and parallel systems.



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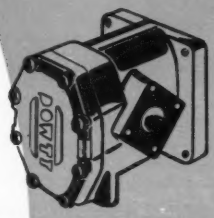

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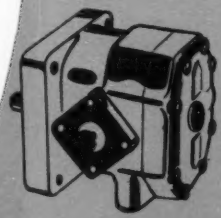

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Up to 30 H.P. — speed range 300-3000 R.P.M. — high starting torque — pressure balancing — overall efficiencies up to 80%.

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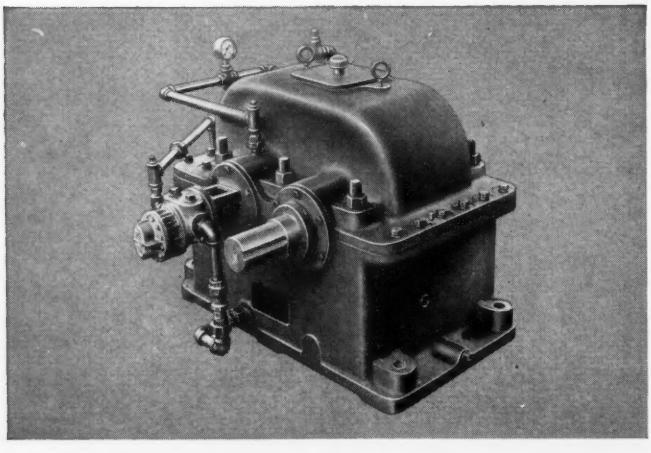
Made in Canada for 25 years.



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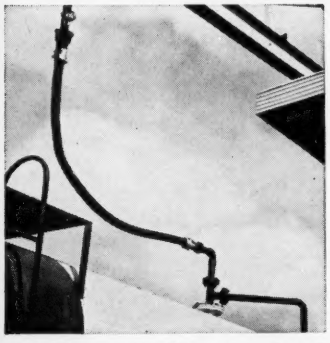
News about HYPALON®

HYPALON hose delivers sulfuric acid for over 4 years... still in good condition

Acid hose lined with HYPALON has given over four years of trouble-free service in unloading 66° Be. sulfuric acid at a battery manufacturing plant. The hose is used three times a month to transfer the acid from tank trucks to rooftop storage tanks.

HYPALON hose is used for its outstanding resistance to strongly oxidizing chemicals and acids. This flexible hose eliminates time-consuming "spotting" of the tank trucks formerly required when rigid piping connections were used.

HYPALON synthetic rubber has many excellent properties which can help reduce your maintenance and replacement costs. Just fill out the coupon for more details.



This HYPALON-lined hose is used to fill storage tanks with concentrated sulfuric acid. Photograph taken at the Reading, Pennsylvania, plant of the Reading Batteries Division of Electric Auto-Lite Company.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

Bulk containers save shipper 1/3 cent per pound

Big neoprene bins replaced paper bags and cut labor costs to the bone. Internal lifting cables are connected to carrying ring in top. Tight closures keep contents clean and dry.

Neoprene bins withstand wear, tear and weather

A plastics manufacturer had been using paper bags to ship granular resin—about 250,000 pounds per month—from one of his plants to another. Now he ships in bulk in these 300-cu.-ft. containers and saves ⅓¢ per pound, mostly in reduced labor costs.

For example, seven containers can be unloaded from a gondola by lift truck and moved to their outdoor storage point in about half an hour. It took 16 man-hours to unload the same amount of resin in 1300 paper bags.

The bins are collapsed for return shipment and used over and over. Their heavy multi-ply wall construction is built for years of hard service. The outer ply is neoprene to take wear and tear and stand off the elements. A fabric carcass provides strength, and an inner ply protects the fabric from the contents. The inner ply is also neoprene in applications requiring better-than-average resistance to oils and chemicals.

For more information about the use of neoprene in bulk shipping containers — or its use in hose, gaskets, belting or protective coatings—just clip the coupon below.

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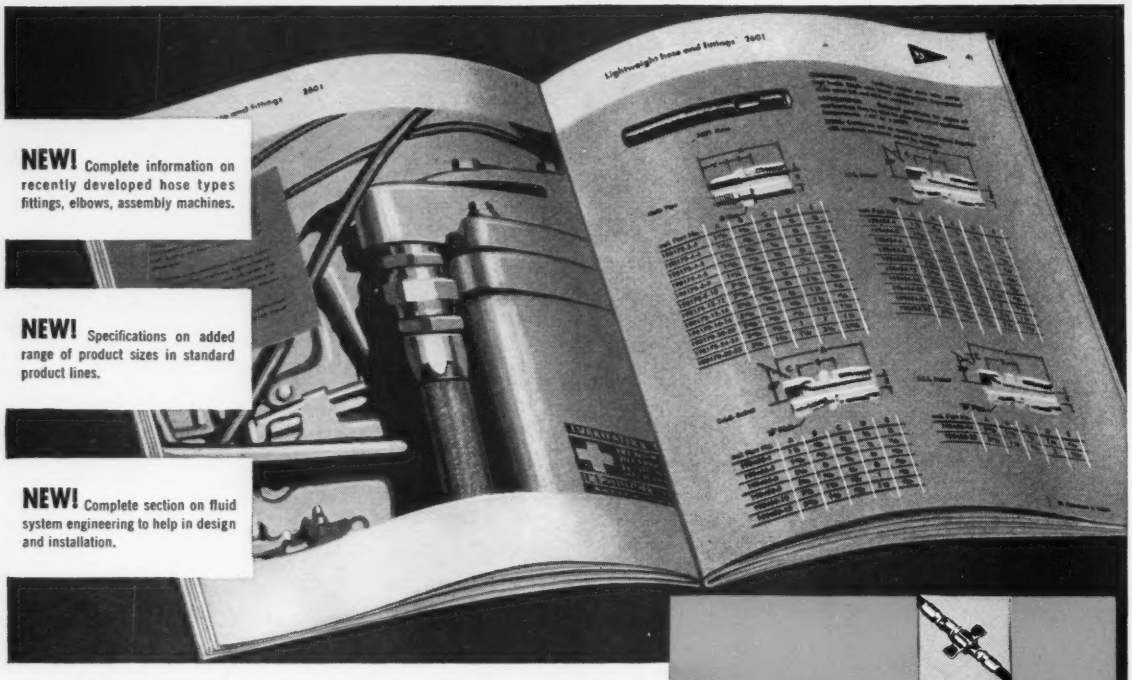
NEW! Complete information on recently developed hose types fittings, elbows, assembly machines.
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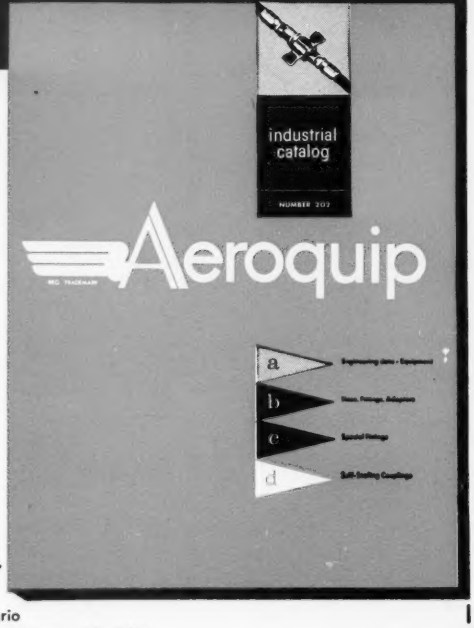

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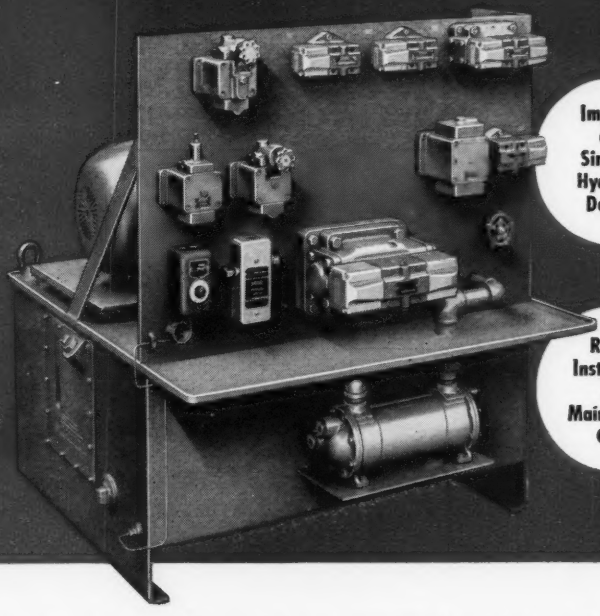

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Reduce Installation and Maintenance Costs

A Vickers Custom Built Power Unit is much more than a collection of parts . . . just as the machines you build are more than the castings, shafting, gears, motors, etc. that go into them.

The Vickers Unit is designed and built with the "know-how" obtained during more than a quarter century of experience in practically every kind of hydraulic operation, plus a thorough understanding of your needs. It is built exactly to your individual requirements. All necessary pumps, valves, intermediate piping, oil reservoir, motors, controls, etc., are in one compact and self-contained "package". It includes all needed hydraulic accessories such as oil filters, air cleaners, oil level gauges, fittings, etc. Hydraulic connections may be grouped in a conveniently located manifold.

The result is simplification of hydraulic design and important savings in installation and maintenance costs. Vickers undivided responsibility for the entire hydraulic control system is another important advantage to both the machine builder and his customer. • Write for new Bulletin 52-45.

VICKERS-SPERRY of Canada Ltd.

Division of Vickers Incorporated

SPERRY RAND CORPORATION

VANCOUVER	TORONTO	MONTREAL
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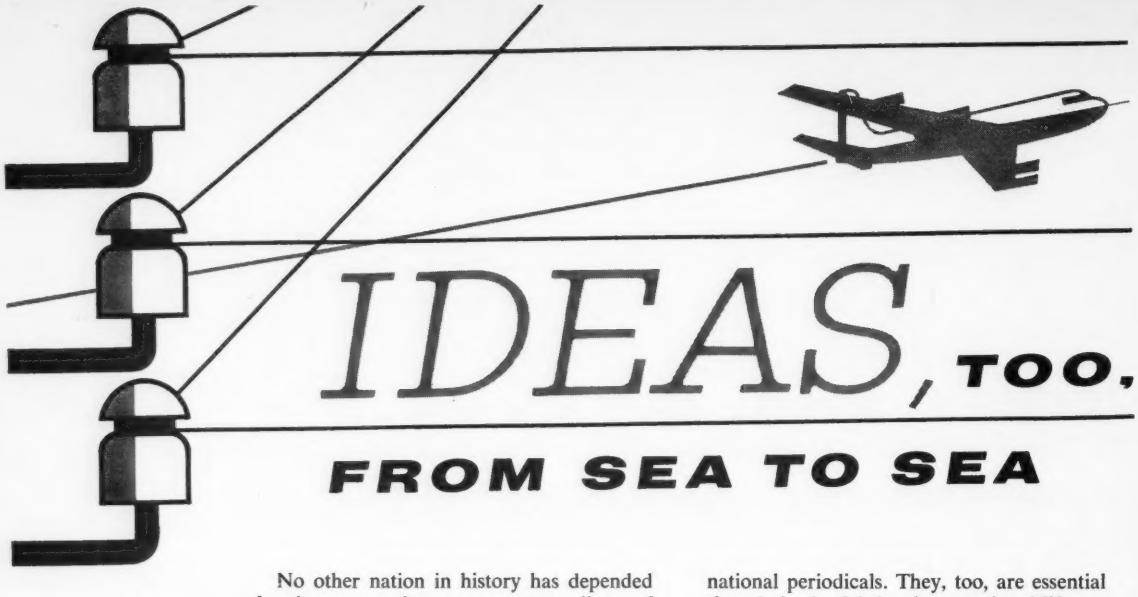
6053-R

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



IDEAS, TOO,

FROM SEA TO SEA

No other nation in history has depended for its very existence on strong lines of communications as has Canada. No nation has been better served by them.

Two railways, an air line, a pipe line, a highway, two telegraph systems and a waterway reaching from the Lakehead to the sea knit Canada together as a single unit. Communications are the basis on which Canadians have built their great commercial and industrial development.

But the communication of ideas is as vital to national growth as is the movement of goods and provision of services. That is the job being done by Canadian magazines and business papers. They serve all groups and areas in the country. The Massey Commission called them "our closest approximation to a national literature." In a young and widespread country like Canada you could not develop commerce or culture without national periodicals. They, too, are essential threads in the fabric of our national life.

As publisher of three magazines, four business newspapers and 31 other business publications, Maclean - Hunter Publishing Company is a part of this important group.

Through their news columns, Maclean-Hunter editors give national significance to many events that would otherwise receive only regional attention. They put national events in perspective that gives them new meaning to people of all regions. They comment vigorously on national issues, from a Canadian point of view.

All Maclean-Hunter editors are dedicated to the principles of accuracy, honesty and fairness. Together they provide unbiased news and sound opinion to more than 3,000,000 readers. We're glad that you are one of them.

MACLEAN-HUNTER PUBLISHING COMPANY LIMITED

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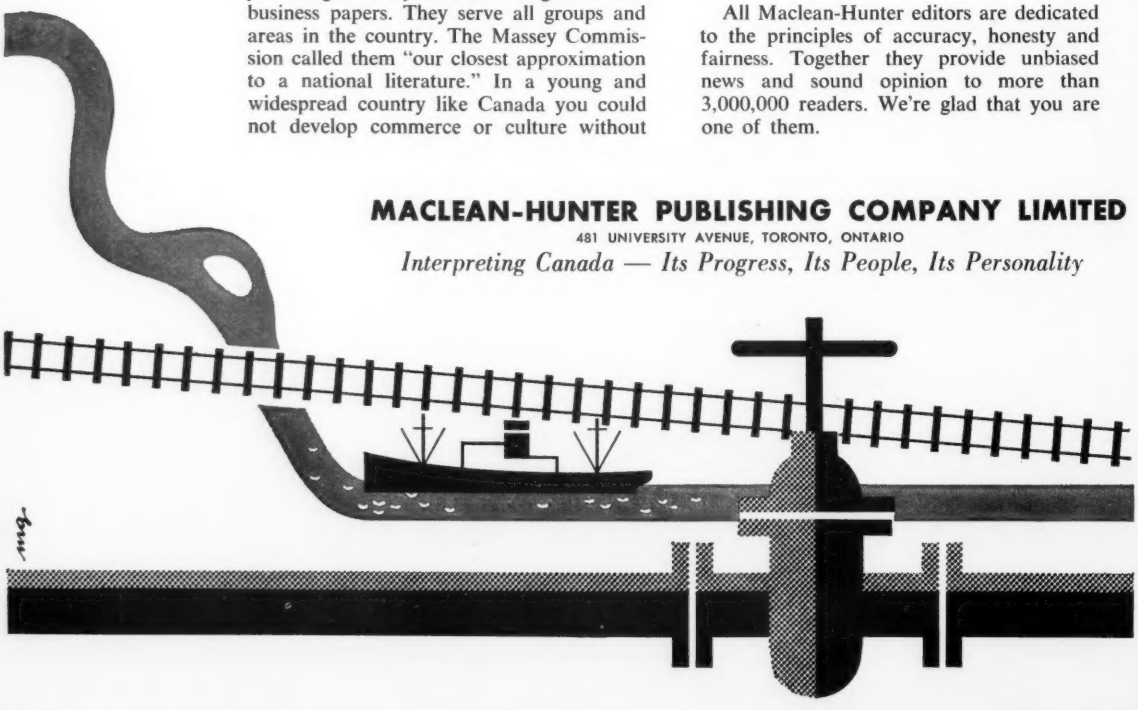
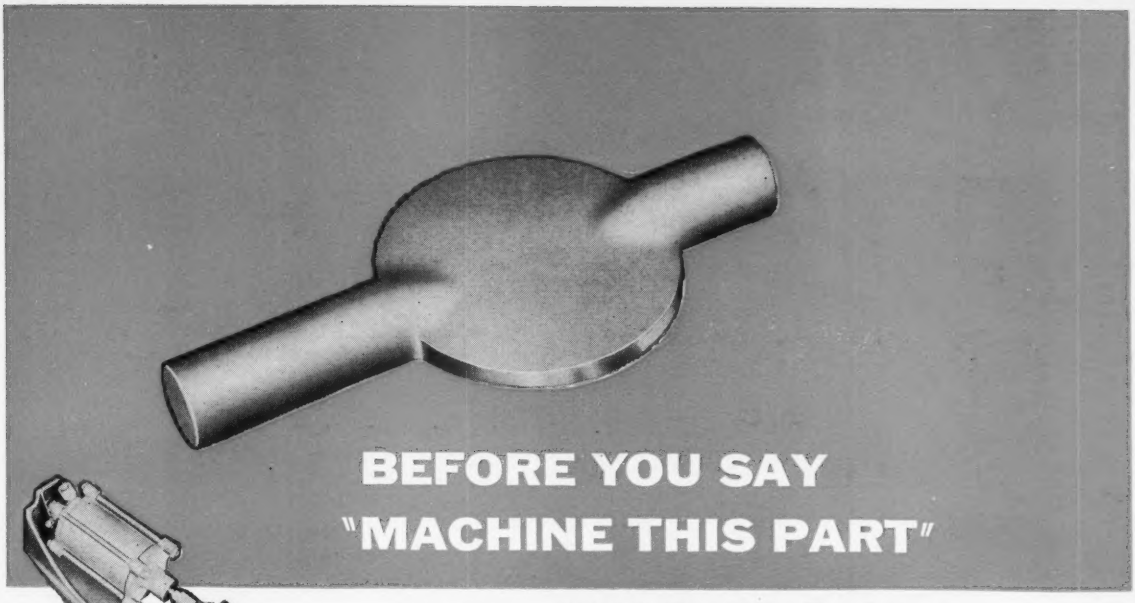
Interpreting Canada — Its Progress, Its People, Its Personality





BEFORE YOU SAY "MACHINE THIS PART"

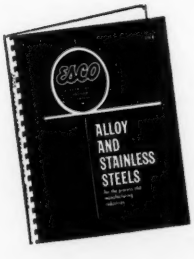
Call an ESCO Casting Engineer

It's often the seemingly simple parts that cause the production "headaches". In this case the "butterfly"—the simple disk and shaft assembly in an exhaust gas actuated power brake. These small parts presented complicated machining and fabricating operations. The elliptical shape of the disk, the compound bevel of the disk edges, the slotting of short length of shafting, welding the shafting in perfect center and alignment on the disk and finally the turning of the shaft ends or bearings. All this fabrication had to be done in a heat-resistant steel to eliminate warpage of the disk, because the blow-by of exhaust gases would result in decreased operational efficiency of the power brake unit.

Oftentimes the answer to such a problem can be as simple as this one was.

. . . "Shellcast this part". And the result . . . a one piece casting combining the elliptical beveled disk with an integral shaft. Cast so smooth and to such close tolerances that the only machining operation to be performed was the bearing ends of the shaft. Heat-resistant *ESCO* Alloy 43H, (A297-55 Grade HH) also eliminated the warpage problem at the same time.

Whether you make butterfly valves, or any one of a million or more complicated components of either low or high alloy steels, before you say "machine this part" call an *ESCO* Casting Engineer.



Write for ESCO booklets No. 175 and No. 205

ESCO LIMITED

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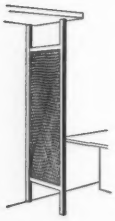
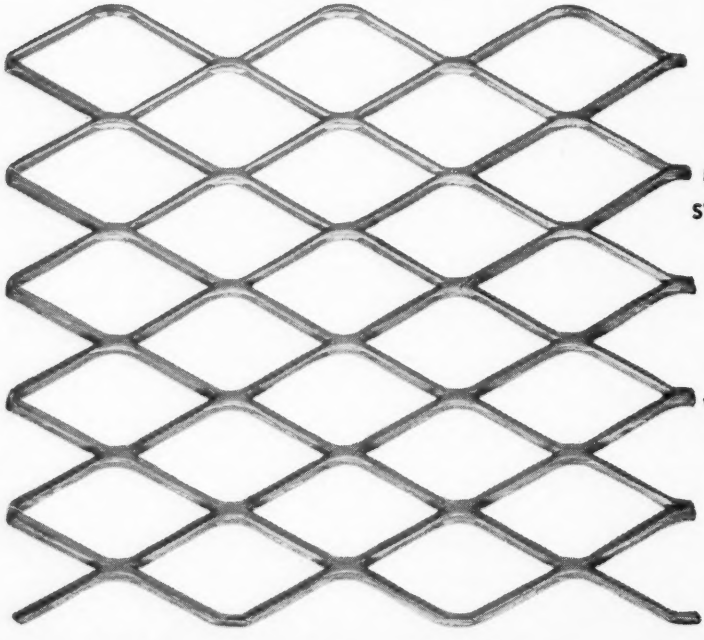
New design freedom...

Amazing versatility...

with PEDLAR

EXPANDED metal





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Machine guards
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The metal mesh of a thousand and one uses!

You can work wonders with Pedlar Expanded Metal . . . and Expanded Metal is wonderful to work with . . . easy to handle, light and airy in appearance, yet amazingly strong. It gives designers and builders a free hand to produce beautiful results . . . quickly, soundly, economically. Grilles, ventilators, bins, fencing, furniture —you name it. Expanded Metal provides the perfect answer. You have a choice of many styles and metals—in regular or flattened form, with a variety of gauges and mesh openings. For practical results, use Pedlar Expanded Metal.

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DU PONT CANADA

PRODUCT ENGINEERING NEWS

PROPERTY AND APPLICATION DATA ON THESE VERSATILE ENGINEERING MATERIALS: "ZYTEL," "ALATHON," "TEFLON," "LUCITE."

SAVE MONEY – read this story about a better design material in plastics

A new concept in plastics utilization is "home-grown" for Canadian industry.

The days of "plastic substitutes" have passed into history. The possibility of precise mechanical design using a plastic material is now a reality — thanks to Du Pont.

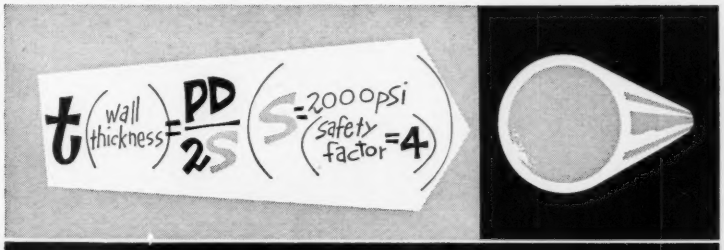
It took a remarkable material, "Zytel" nylon resin, to make the effort worthwhile.

"Zytel" nylon, plus good design and competent fabrication offers many cost-saving possibilities. These are brought about through lower initial costs and better performance of many mechanical parts in machines, hardware, appliances — even in notions, novelties and housewares. These possibilities should be of considerable importance to Canadian manufacturers faced with finding lower costs and better merchandise to meet the stiff competition of today.

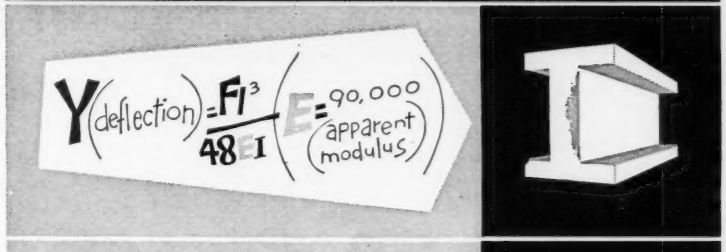
"Zytel" nylon resin is made in Canada, at our Kingston, Ont., works, from Canadian raw materials.

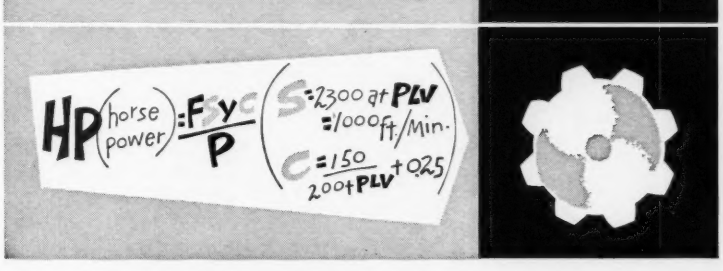
Actually, we do more than just make the resin. We also extend assistance to engineers and designers, to help them utilize the properties of "Zytel" to advantage, and of course, we assist molders in establishing optimum operating conditions required to faithfully reproduce the properties of the material in finished parts. In short, we provide a touch of creative imagination backed by sound technical knowledge along with a product of proven value.

There are several well-qualified Canadian molders who can help you to get these new values for your product. Why not let them — and us — have a chance to see what we can do for you?



"ZYTEL"- The Versatile Answer to Many Engineering Problems





NEED MORE INFORMATION?

Clip the coupon for additional data on the properties and applications of this versatile Du Pont engineering material.

DU PONT COMPANY OF CANADA (1956) LIMITED,
CHEMICALS DEPARTMENT, P.O. Box 660, Room A-4, MONTREAL, QUE. DE-7

Please send me more information on the Du Pont plastic engineering materials checked: ☐ *"Zytel"*; ☐ *"Alathon"*; ☐ *"Teflon"*; ☐ *"Lucite". I am interested in evaluating these materials for*

_____

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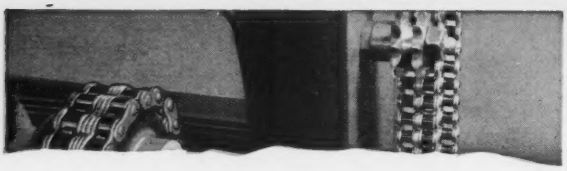
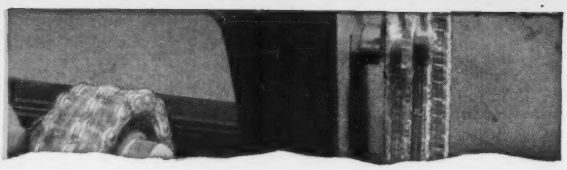
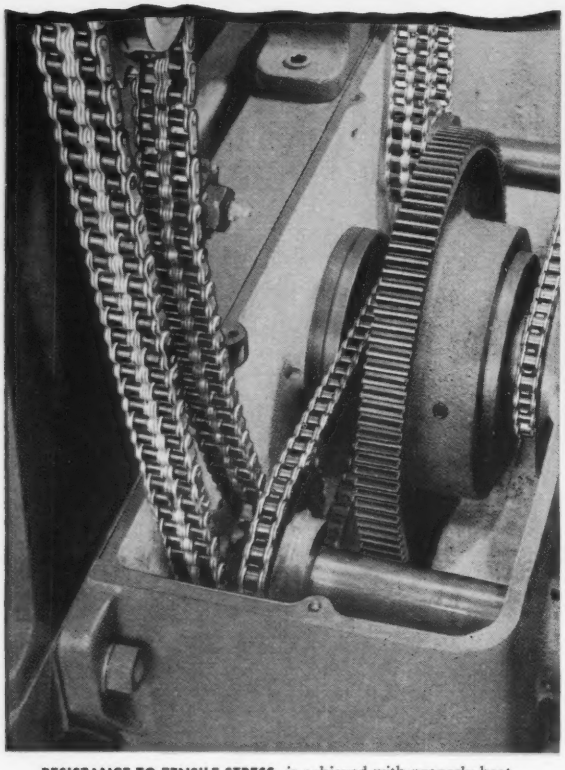
*"Alathon" "Lucite" and "Teflon" are registered trade-marks of E. I. du Pont de Nemours & Co. (Inc.)

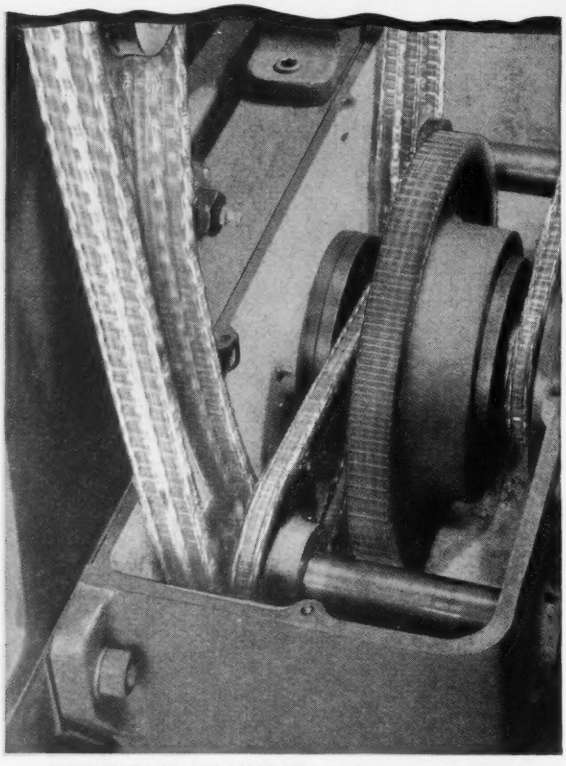




To static strength . . . add *dynamic strength*



RESISTANCE TO TENSILE STRESS is achieved with properly heat-treated, accurately machined side bars made of premium steel and fitted with properly hardened pins, bushings, rollers.



STRENGTH OF CHAIN IN MOTION results from such refinements as pitch-hole preparation, micro-finish of parts, special processing of side bars, pre-lubrication, rigid quality control.

Why LINK-BELT roller chain takes stresses in stride

ON *tough-service* drives and conveyors, Link-Belt precision steel roller chain consistently delivers longer life. That's because its *greater dynamic strength* withstands the starting shock and centrifugal loads of severe operation.

Reports from users prove the effectiveness of Link-Belt's manufacturing extras that add to greater dynamic strength. Shot-peened rollers give greater fatigue life and ability to withstand impact . . . lock-type bushings end a common cause of chain stiffness . . . pre-stressing provides uniform load distribution . . . closer heat-treat control insures uniformity.

For facts, see your nearby Link-Belt office or authorized stock-carrying distributor. 14,643-C

LINK-BELT

ROLLER CHAIN AND SPROCKETS

LINK-BELT LIMITED: Scarboro Plant, General Offices and District Sales—1960 Eglinton Avenue, E., Scarboro, Ont., Station H, Toronto 13 • Eastern Avenue Plant and Factory Branch Store—731 Eastern Avenue, Toronto 8 • Sales Offices and Factory Branch Stores—Montreal 15: 945 Beaumont Avenue • Vancouver 12: 2550 Boundary Road • Winnipeg 10: 1315 Portage Avenue • Swastika, Ont.: 8 Boisvert Street • Halifax: Austen Bros. Ltd., 118 Hollis Street • District Sales Offices—Hamilton: 605 James Street, N. • Sydney: Austen Bros. Ltd., 361 George Street • Foundry at Elmira, Ont., 19 Church Street, E.

Vertical unit —drive shaft above—10 VT
Vertical unit-drive shaft below—10 VD
Double Reduction Unit 00 D
Unit with worm above gear—10 RT
Unit with worm below gear—10 AT
10 RT with worm and gear removed
CLEVELAND

Every small worm gear unit is built to precision standards—as outstanding in quality and performance as larger size Clevelands.
Illustrated above are the 10 AT (left) and 00 D (right) speed reducers.

Enjoy the benefits of worm gear drives in smaller CLEVELAND speed reducers

WHEN you want a quiet, powerful, dependable drive for a small machine, choose a Cleveland Worm Gear Speed Reducer.

As built by Cleveland, the worm gear reducer is a drive of many advantages:

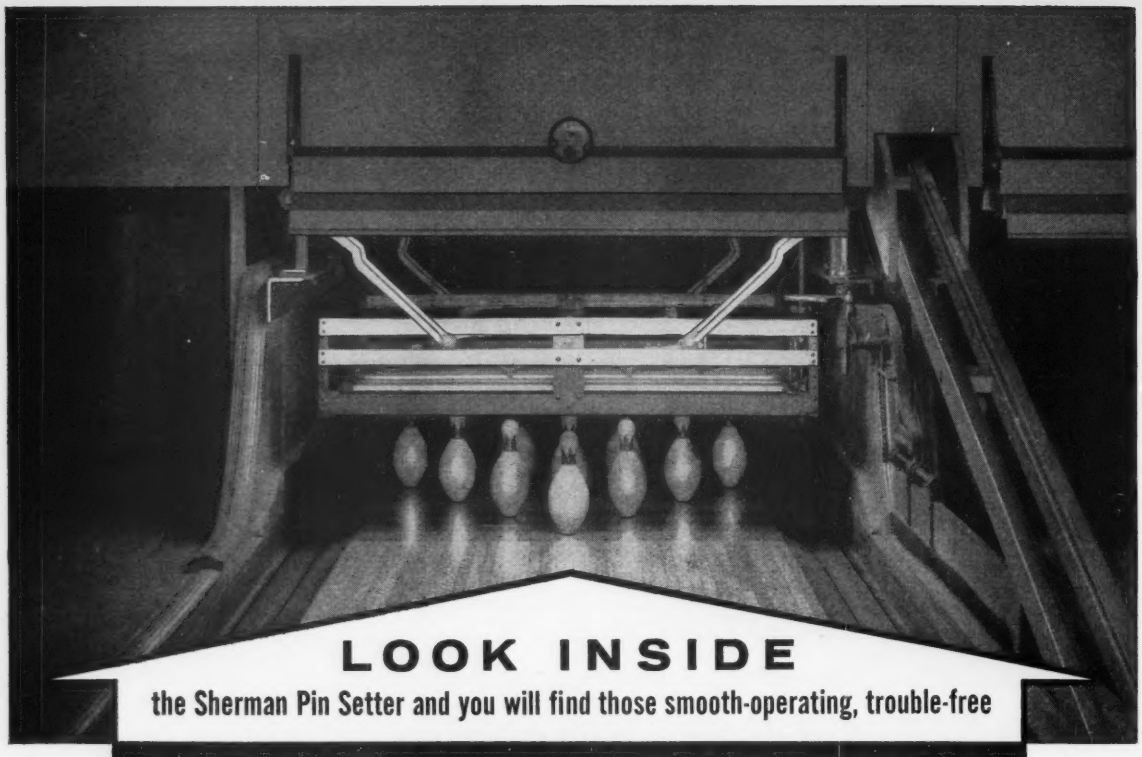
1. It is compact and inherently quiet, transmitting power with smooth, uninterrupted torque flow.
2. Its right-angled design saves valuable space.
3. It has a minimum of moving parts.
4. Shock load resistance and other factors of safety are high.
5. Rate of wear of case hardened steel worm on nickel-bronze gear is very low, insuring long life.

Write for Bulletin 114F which illustrates and gives engineering data on smaller size Clevelands—many now available for immediate delivery. Peacock Brothers Limited, P. O. Box 1040, Montreal 3, Que. Branch offices in Sydney, Toronto, Sudbury, Winnipeg, Edmonton, Calgary and Vancouver.

CLEVELAND *Speed Reducers*

Made and Sold in Canada by . . .

PEACOCK BROTHERS LIMITED



LOOK INSIDE

the Sherman Pin Setter and you will find those smooth-operating, trouble-free

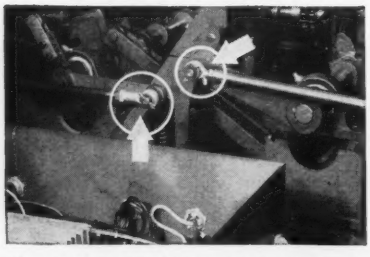
HEIM *Unibal*® ROD ENDS

Bowlers like duckpins at all hours of the day — times when pinboys are not always available. The Sherman Pin Spotter is an automatic device for setting the pins on their spots, sweeping the alley clear of deadwood, replacing remaining pins for next shot, and returning balls for next frame. These pin setters, presently made by Crompton & Knowles Corp., must be ready to operate at all times at the push of a button.

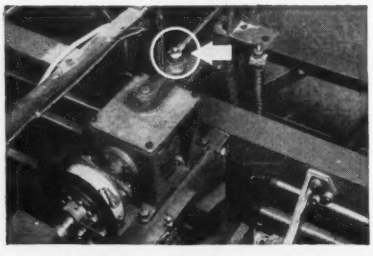
Photos taken at Johnson's Bowling Academy, Hamden, Conn.

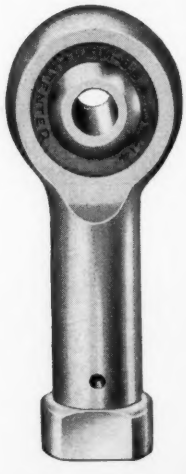
HEIM UNIBAL ROD ENDS contribute trouble-free dependability to the push-pull rods on the distributor table drive assembly, and carry the full thrust load of the sweep drive assembly (the swinging arm which sweeps the alley clear of deadwood).

Distributor table drive assembly.



Sweep drive assembly.





If you could look inside any equipment where power/motion is being transmitted at varying angles, you would find the Heim Unibal being used in more and more applications. It is the original Spherical Bearing developed, engineered, and manufactured by The Heim Company for over fifteen years.

Load ratings, specifications, and sizes are all shown in the complete catalog of Heim bearings.
Write for copy, and for any special engineering data.

R&M BEARINGS CANADA LTD.

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ACTUATE

MORE EASILY...
EFFICIENTLY...
ECONOMICALLY

ROLLED THREAD

SAGINAW b/b SCREWS

Make Your Product

- **easier to produce**
- **easier to operate**
- **easier to sell**

The secret lies in a new anti-friction principle—steel balls recirculating in closed-circuit raceways. They permit Saginaw b/b Screws to change rotary motion into linear motion with over 90% efficiency and 4/5 less torque than Acme screws. Result: Saginaw b/b Screws save manual effort or electrical power; they permit space savings—smaller motors and gear boxes; they provide more dependable performance; more precise positioning; more temperature tolerance and more lubrication latitude.

SEVEN STANDARD SIZES REDUCE COSTS

Top-quality Saginaw b/b Screws are the only kind stocked in seven standard commercial rolled thread sizes, cut to desired length, for low cost and fast delivery. Or you can order custom machined screws for critical or extreme precision applications. Saginaw has successfully built screws from 1½ inches to 39½ feet long—⅜ inches to 10 inches diameter.

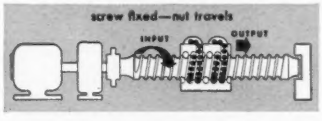
MANY TYPICAL APPLICATIONS

Saginaw b/b Screws have been applied to automatic garage doors, automobile seat adjusters and window lifts, barber chairs, hospital beds, bumper jacks and circuit breakers. Or they can be used for heavy industry equipment like die table positioners, drill presses, lift trucks and welders.

FREE ENGINEERING HELP FOR YOUR SPECIAL APPLICATION

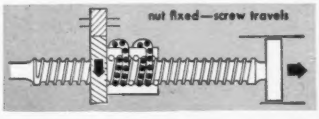
Automatic Garage Door lifts and lowers easily and smoothly when actuated by Saginaw b/b Rolled Thread Screw.

HOW THE WORLD'S MOST EFFICIENT ROTO-LINEAR DEVICE WORKS



When rotary motion is applied to the screw, the b/b nut is driven along the axis of the screw, changing rotary motion to linear motion with over 90% efficiency.

When rotary motion is applied to the b/b nut, the screw is driven along its longitudinal axis, changing rotary motion to linear motion with over 90% efficiency.



LET SAGINAW'S EXPERIENCED ENGINEERS HELP SOLVE YOUR SPECIAL APPLICATION PROBLEMS . JUST WRITE OR PHONE US—NO OBLIGATION

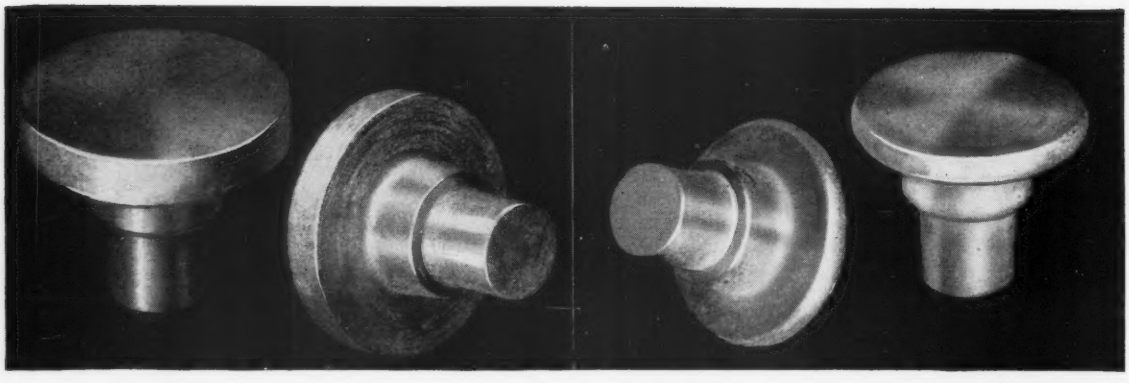
Saginaw ball bearing Screw

SAGINAW STEERING GEAR DIVISION • GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN

TO SAVE ON **FASTENERS**

Standardize your Specials

THROUGH STELCO COLD HEADING



Machined "Special" . . . slightly redesigned as a Cold Headed "Standard"

The simple Flat Head Shoulder Rivet shown on the left above (enlarged), was slightly amended as seen on the right, to permit production by cold heading instead of by machining. The elimination of scrap loss, combined with increased speed of production, brought a saving of 80% to the purchaser.

Pictured below are several other "specials" standardized by Stelco with considerable cost reduction.

57121.B

Result - 80% Savings!

Stelco's modern bolt-making facilities, plus the services of Specialty Fastener Representatives, offer you three ways to save on "special" fasteners —

FIRST — Many types of contoured parts can be produced by cold heading more economically than by machining. Not all savings are as impressive as the one illustrated above, but *cost reductions in the region of 40% are not uncommon* and are often accompanied by minor redesigning which adds to the strength of the part. Secondary operations, such as thread rolling or cutting, knurling, extruding, flattening, piercing, drilling, broaching, and bending are also provided for in Stelco's facilities.

SECOND — Stelco will carry as stock items your long-run repetitive "specials" — giving you a ready source of supply and the benefit of large-quantity prices.

THIRD — Your "special" requirement might already be in stock as a Stelco "Standard" — or possibly an existing "special" could meet your needs. In either case you would realise a saving.

Why not ask Stelco's Engineers to examine *your* "specials"? If they are adaptable to production by the cold heading process your cost reductions will be substantial. Any Stelco Sales Office is at your service.

THE STEEL COMPANY OF CANADA, LIMITED

Executive Offices: Hamilton and Montreal

Sales Offices: Halifax, Saint John, Montreal, Ottawa, Toronto, Hamilton, London, Windsor, Winnipeg, Edmonton, Vancouver. J. C. Pratt & Co. Limited, St. John's, Newfoundland.

A smart hunter knows this sign means deer...

A smart bearing buyer knows this sign means value...

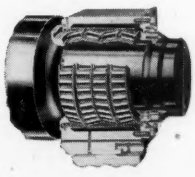
TIMKEN

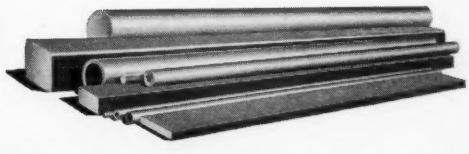
TRADE-MARK REG. IN CANADA AND U.S.PAT. OFF.

SMART bearing buyers know the trade-mark "Timken" on a product means they get the greatest value for their money. It's a registered trade-mark identifying tapered roller bearings, fine alloy steel bars, seamless steel tubing and removable rock bits, products that are made by The Timken Roller Bearing Company.

And the name "Timken" stands for highest quality. Quality that industry knows and wants. Quality with a backing of 59 years' experience, safeguarded at every step from melt of steel to finished product.

It will pay you to remember that "Timken" is a trade-mark, not just a type of product. If you're looking for the best, look for the trade-mark "Timken". It's your assurance of getting the highest value. Timken bearings and removable rock bits are made in Canada for Canadian industry. The Timken Roller Bearing Company, Canton 6, Ohio, U.S.A. **CANADIAN PLANT:** St. Thomas, Ontario. Cable: "TIMROSCO".





TAPERED ROLLER BEARINGS • REMOVABLE ROCK BITS • FINE ALLOY STEEL

Another packaging achievement of superior design and quality–

BY HYGRADE

proves safest, most adjustable... cuts costs — labour — storage space

This new package for shipping curved glass windshields was adopted by automobile manufacturers after extensive, rigorous tests proved its superiority on every count.

A special feature of this unique pack is the "serpentine" slot—a device which provides a high degree of flexibility in fitting the various contours of windshields, and side to side cushioning of the glass. It provides yet another striking example of the consistently high quality, wide range and versatility of Corrugated Containers *custom-made* by HYGRADE with *100% Kraft liner.*

Remember—the container you ship your product in *can* make a difference to your profit picture. A superior quality HYGRADE Container is your surest guarantee of economical product protection. For expert help in solving *your* packaging problems quickly and efficiently, call on HYGRADE's Technical Service Division. Check with the sales office nearest you.

For containers designed to go places, call

HYGRADE CONTAINERS LIMITED

Plants: LONDON • TORONTO • MONTREAL

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A Subsidiary of **CANADIAN INTERNATIONAL PAPER COMPANY**

West Coast Giant's Flute?

In reality "Main Headers for feeding newsprint stock to Miami Selectifier screens"—fabricated entirely of Atlas type 316 stainless. This performs well in the severe corrosive conditions found in the paper making industry. Another example of the benefits of stainless steels to an industry where efficiency of operation demands the use of the ultimate in materials.

AGENTS THROUGHOUT THE WORLD

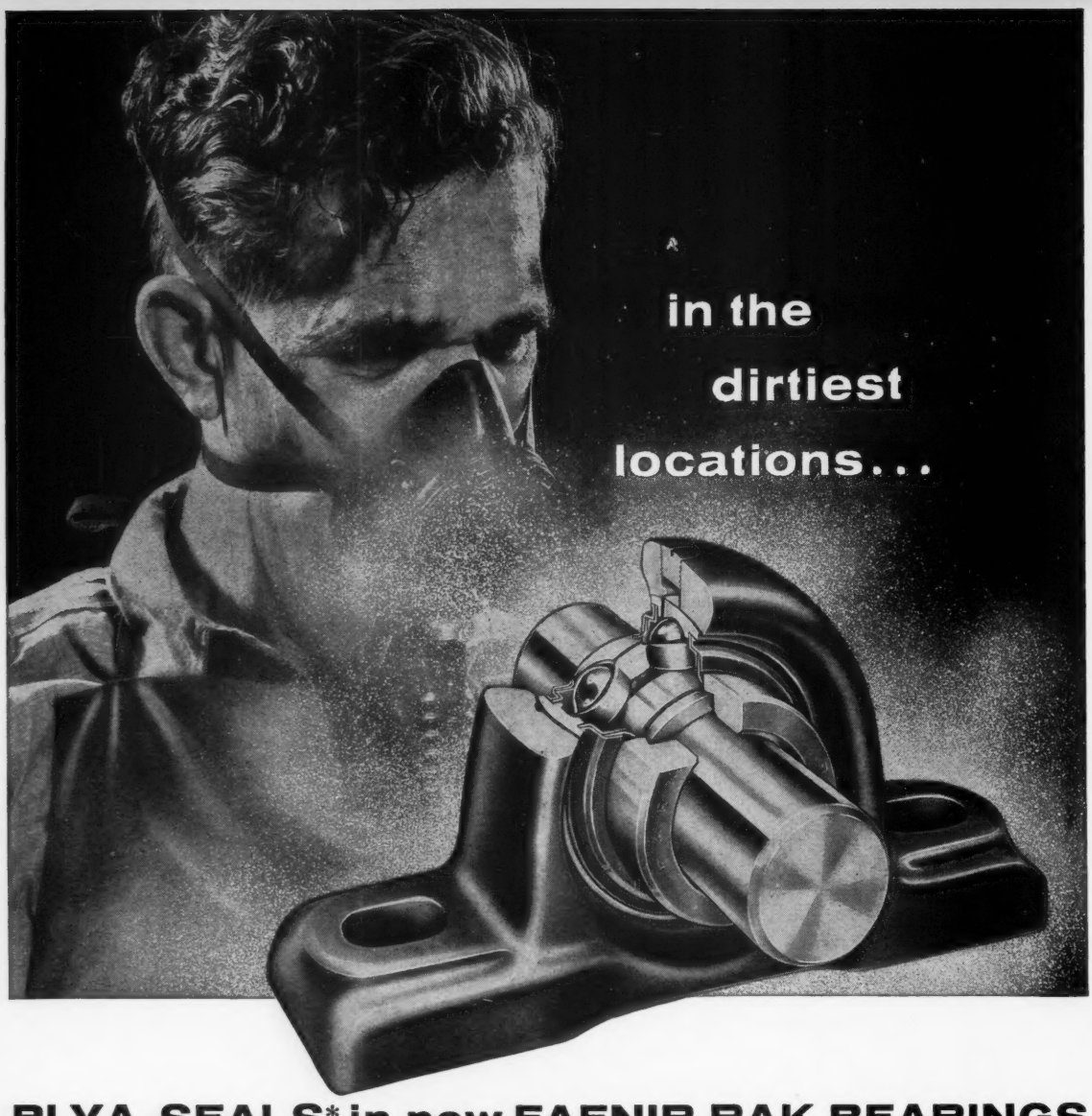
ATLAS STAINLESS STEELS

ATLAS STEELS LIMITED
Welland, Ontario

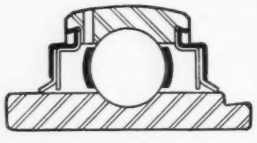
Warehouses: Montreal, Toronto, Hamilton, Windsor, Winnipeg, Vancouver

Representatives: London, St. Catharines, Sudbury

SS-4-58



PLYA-SEALS* in new FAFNIR RAK BEARINGS shut out dirt even at very slow speeds



***PLYA-SEAL**

shown in this cross-section consists of a synthetic, rubber impregnated, sealing washer, sandwiched between two "dished" steel plates. Outside pressure from contaminants increases the seal's effectiveness as the flared lip tightens against its contact surface and against the innermost supporting plate.

New Fafnir RAK type pillow blocks incorporating Wide Inner Ring Bearings with Plya-Seals are *specially* designed for dirty operating conditions.

The contact type Plya-Seals offer many outstanding advantages: they effectively seal out contaminants at low speeds, while retaining their grease supply. Close clearance between inner supporting seal member and outside diameter of inner ring keeps seal from pushing in.

RAK Pillow Blocks with Plya-Seal Wide Inner Ring Bearings are dimensionally interchangeable with the famous Fafnir LAK Mechanical-Seal type pillow blocks available in popular shaft sizes from ½" to 2-15/16"; feature the exclusive Fafnir Self-Locking Collar which eliminates the need for lock nuts, washers, shoulders, sleeves and adapters.

For full details, contact: United Steel Corporation Limited, 58 Pelham Avenue, Toronto 9.

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United Steel

CORPORATION LIMITED

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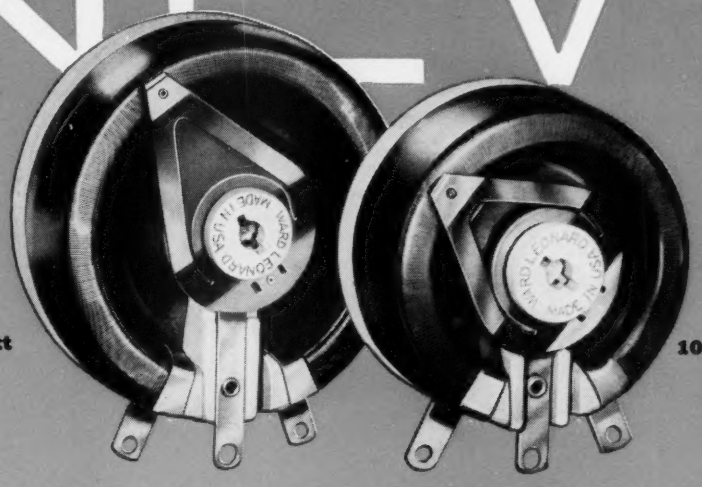
NEW



SMOOTH-PERFORMING RING RHEOSTATS

New 100- and 150-watt sizes incorporate latest design improvements

ENGINEERING DATA

Type	Rating*	Ring Diameter	Max. Depth behind panel	Resistance Range (Stock Values)	Rotational Travel
100R	100 Watts	3 5/32"	1½"	1 to 10,000 ohms	300°
150R	150 Watts	4"	1¾"	1 to 10,000 ohms	314°

*—Ratings based on a 300°C rise in a 40°C ambient.

Contact Shoe: "Twin" metal graphite, equipped with integral copper leaf conductor ribbon riveted to the control arm.

Contact Arm: Balanced beryllium copper, locked directly to insulating hub.

Base and Core: High-grade ceramic of high dielectric strength with toroidally wound resistance wire or ribbon of highest stability.

Max. Voltage Spacings: 300 volts in accordance with Underwriters' Laboratories requirements.

Naturally, these new 100- and 150-watt ring rheostats give you the same outstanding, proved design features you get in 25-, 50-, and 300-watt sizes. Exclusive "twin-contact" shoes insure uniform contact resistance, extra-smooth resistance change. Two sintered, self-lubricating contacts—one on the collector ring and one on the resistance winding—can't gall or seize like metal-to-metal contacts. They insure long, stable operating life under rated loads.

Ward Leonard Vitrohm vitreous enamel permanently bonds base and core, firmly secures the high-stability resistance wire. Base and core are of high-density, low-porosity molded ceramic of high dielectric strength.

A new ceramic hub design substantially eliminates backlash. It also makes for fast delivery on special shaft requirements.

Write for Ward Leonard Bulletin 60RR. It gives complete specifications on 25-, 50-, 100-, 150-, and 300-watt ring rheostats. Ward Leonard of Canada Limited, 1070 Birchmount Road, Toronto 16.

5824

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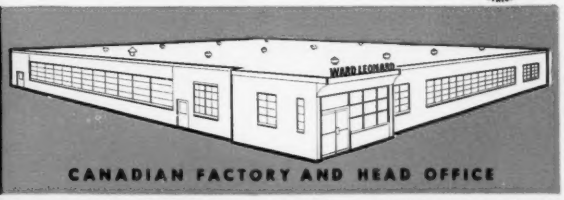
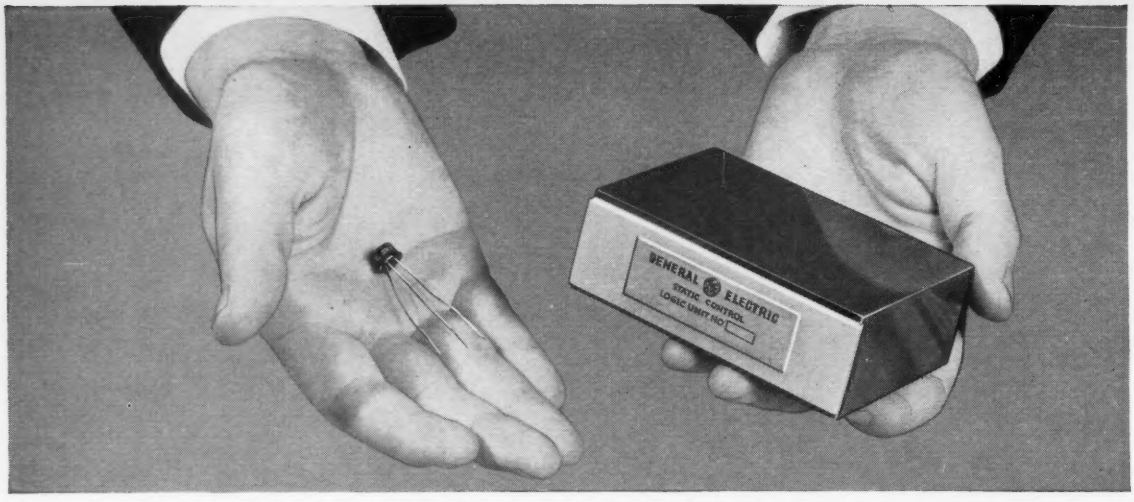
WARD LEONARD
OF CANADA LIMITED
1070 BIRCHMOUNT ROAD TORONTO 16



CANADIAN FACTORY AND HEAD OFFICE

Resistors • Rheostats • Relays • Motor Controls • Dimmers • Switchboards • SAFT Batteries • Barkelew Switches • Kenco Pumps

A GREAT STEP FORWARD WITH TRANSISTORS . . .



Basis of the new G-E Unilog Static Control System is the transistorized universal logic unit which incorporates four logic elements. Each unit is capable of performing simultaneously any of four separate functions. In addition, General Electric Unilog Control may be equipped with time-delay, permanent memory and other ancillary units to permit fully automatic control of complex manufacturing processes.

ANNOUNCING *NEW* General Electric UNILOG High Speed, Static Control

Now, for the first time Canadian General Electric presents a static control system for industry which uses transistor switching elements. Fully researched and developed in C.G.E.'s advanced engineering laboratories at Peterborough, Ont., the new G-E Unilog system—a compact, high-speed, static control—is now available to meet your exact needs.

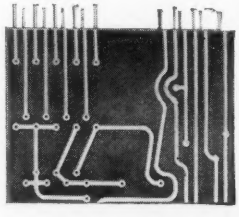
This remarkable advance in industry control equipment offers many benefits:

Fully Transistorized, exceptionally long life and high speed are inherent features of the new G-E Unilog Control. It operates several hundred times faster than equipment using magnetic amplifiers. Control speed is no longer a limiting factor in production speed-up programs.

Unlimited Application and Compatibility with all types of existing and forseeable computer techniques is possible. G-E Unilog Control can operate directly in step with the latest types of electronic computers. Counting, both physical and electrical, is only one of the automatic processes now practical.

Space Saving is another benefit. G-E Unilog Control is much more compact than other types of industrial static control equipment.

Low Power Consumption, Instantaneous Warm-Up and Resetting, Standard Power Supply and *High Unit Standardization* are just a few of the exclusive features of the new G-E Unilog Static Control System.



Transistors, semi-conductor rectifiers and other components of the G-E Universal Logic Units are mounted on and interconnected by this unique Inlaid Circuit Board. The complete board is then encapsulated in thermosetting plastic which provides complete protection against adverse atmospheric conditions and greatly extends unit life.

For more detailed information, contact your nearest C-G-E Sales Office or write to: Apparatus Dept., Canadian General Electric Co. Ltd., Peterborough, Ont.

GENERAL ELECTRIC
INDUSTRY CONTROL

Apparatus Department

9204-26401

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

Potentiometer: moving parts sealed in an oil bath

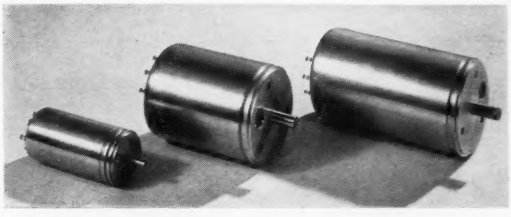
A newly developed liquid-filled potentiometer, with all its moving parts sealed in a bath of oil, is **Helipot Corporation's** solution for degradation and performance problems experienced with precision potentiometers.

Among the significant advantages claimed over conventional models are the following: as many as 20 million shaft revolutions (up to 10 times normal life expectancy); greatly reduced noise; increased dielectric strength; prolonged shelf-life; greater heat dissipation and operation under water.

The basic design principle is simple and may be applied to most potentiometer sizes now produced by Helipot. A standard "dry" model with a special metal lid is placed in an all-metal housing. The CW, CCW and slider leads are soldered to corresponding outer-housing terminals; the housing is then sealed.

Next step is to fill the pot with oil under vacuum conditions to make sure no air spaces are left to vary in volume as the result of increases or decreases in atmospheric pressure. Since oil, itself, changes in volume by as much as 10% over the operating temperature range of the potentiometer, a means is provided for the necessary equalization of pressures.

Three specially drilled holes in the inner housing allow the oil to pass from inside the pot to the space between the metal housing and interior housing. The oil thus effectively cushions the unit against shock and environmental changes. (203)



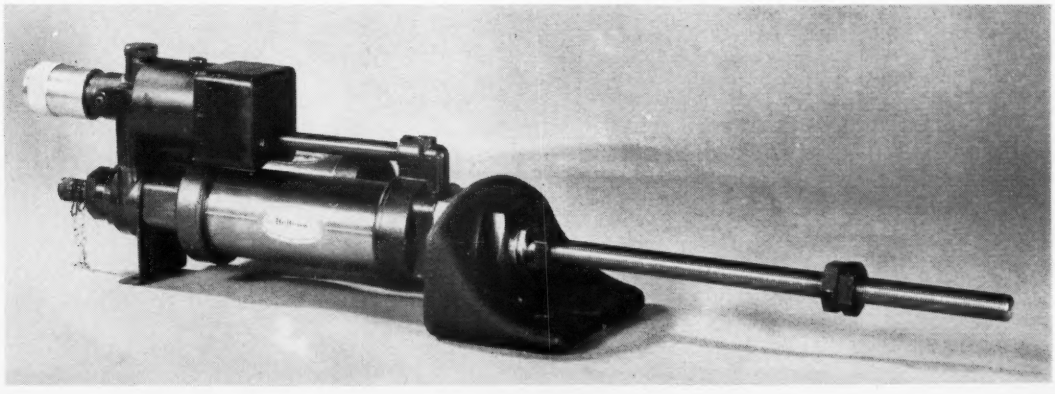
Precision control: checks loads up to 3,000 lb.

For extreme accuracy of movement, **The Bellows Company** Model DCP-50A precision control Hydro-Check converts air or mechanically powered machine elements to micro-precision devices. The Hydro-Check may be set to check the air cylinder or mechanical machine element at any desired point. This heavy duty unit will check loads up to a maximum of 3,000 lb.

It automatically compensates for variations in pressure, temperature and load. Fluctuations in air-line pressure and variations in piston-rod load cause no change in the feed rate and thrust selected for a particular operation. This is accomplished by a precision control valve which incorporates automatic flow, and thermal compensation devices and a sintered metal filter.

A liquid-filled metallic bellows constantly corrects the needle valve orifice in accordance with changes in hydraulic oil temperature. Feed rate is entirely independent of variations in temperature and viscosity. This repetitive accuracy permits a consistency of control to provide the ultimate in tolerances and finish of work pieces. In time study applications, this feature is considered most desirable.

The DCP-50A Hydro-Check is available in standard stroke lengths from 2 to 18 in. and with various mounting arrangements. Dimensionally, a unit with a 6-in. stroke has an over-all length (piston rod in the retracted position) of 14 41/64 in. The unit may include optional stop and skip valves (pneumatically or electrically controlled) to make the unit capable of almost unlimited application. (204)

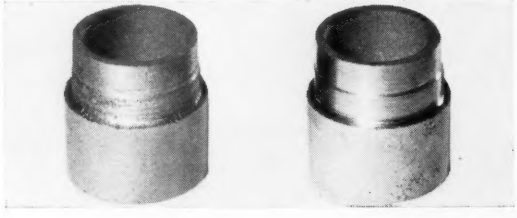


Sintered iron: this will machine excellently

A free-machining iron has been developed (Powdiron FM) very recently by **Bound Brook Oil-less Bearing Company.** Sintered iron has been one of the most difficult materials to machine properly, for it was necessary to use a sharp pointed tool, and frequently the cuts were actually tears, since every cut was an interrupted one, due to porosity. Tools wore out very rapidly.

Powdiron FM will, however, machine excellently. Cutting speeds and surface finish are comparable to those of mild steel. Tool life is at least tripled. The illustration shows a sample of the standard sintered iron, and the free-machining sintered iron. Both were machined with the same carbide tool, speed and depth of cut. Rough cuts were 0.030 in. at 550 sfpm; finish cuts were 0.007 in. at about 1,100 sfpm.

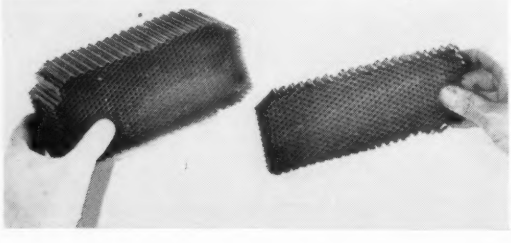
This new material is a straight sintered iron with standard densities and physicals comparable to the average sintered iron produced today. Its ductility and free machining characteristics make it one of the most important developments in sintered materials in many years. Its impact is already being felt in both bearings and structural parts where machining is required, and it has just been released for national distribution. (205)



Laminating resin: a phenolic that stands the heat

A phenolic laminating resin has been developed by **Barrett Division,** Allied Chemical Corp., for the fabrication of lightweight radomes, missile heads and complex structural aircraft parts.

Parts fabricated of the material (known as Plaskon laminating varnish V-204) will retain their high strength at 500 or 600 F. Its strength at high temperature is said to exceed that of the chief competitive phenolic formerly used for these applications.



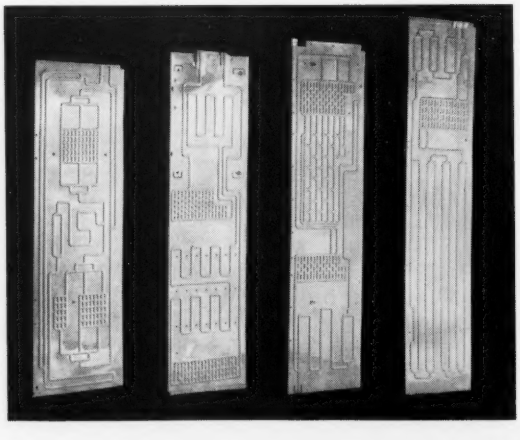
Development of heat-resistant phenolic resin is the direct result of the aircraft industry's need for a lightweight material that will retain most of its strength and stiffness at the elevated temperatures caused by air friction at high speed. (Glass-reinforced polyesters were formerly used for these structural aircraft parts.)

Following extensive field testing, Plaskon V-204 has entered commercial use for the fabrication of aircraft and missile parts consisting of asbestos and glass-reinforced laminates, glass honeycomb structures and matched-metal die-molded and vacuum bag molded shapes. (206)

Aluminum: tubes in the sheet for heat exchange equipment

Calorex is the trade name (used by **Aluminum Goods Limited**) to designate a homogeneous sheet of aluminum with integral tubing. It is made by the roll-bonding process.

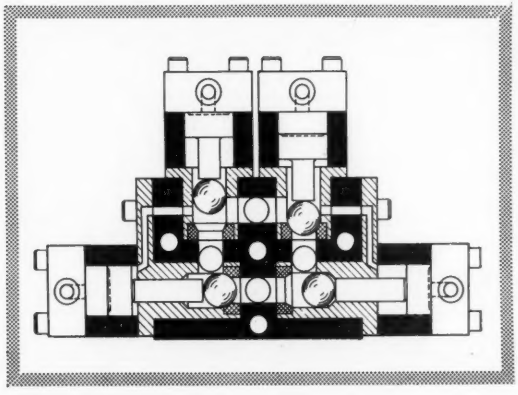
This modern development in metal technology is being used largely by the refrigeration industry as the latest in heat-exchange equipment. Manufacturers in other industries are now studying its properties and potential uses. (207)



Valve: ball design relieves shock pressure

This valve (manufactured by **Almar Hydraulic Valve Company**) can easily be repaired without removing the valve from its position in the hydraulic circuit. It is made for any fluid, regardless of viscosity or lubrication qualities. Although it is an hydraulic valve, it is nevertheless tested on compressed air (with absolutely no leakage) before shipment.

The valve incorporates 4 hardened steel balls, each of which is pressed against individual hardened steel seats for closing the fluid passage that it governs. Balls and seats are easily removed for replacement when necessary. All four-way valves are identical for use either as a two position or a three position valve. The three position valve will have a centre position where all balls are seated and all passages are blocked. The two position valve will shift through the centre position without hesitation. This dual use of the same valve will simplify installation and reduce the quantity of spare valves needed.



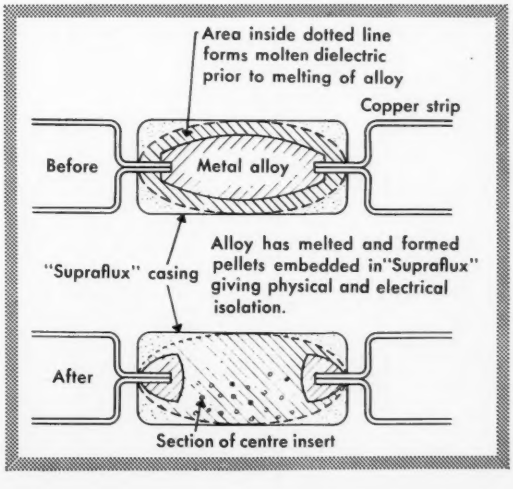
In design, one ball and one seat is placed in each fluid passage between the pressure port and each cylinder port, and between each cylinder port and the drain port. The balls are pressed against their seats by the action of integral individual small hydraulic cylinders, pilot operated. When pilot pressure is applied to the small cylinders, the ball will seal the passage; when the pilot pressure is removed, the internal pressure against the ball will move the ball out of the way for fluid flow.

One outstanding feature of a valve is that it will relieve shock pressure. The area of the piston in each small cylinder is twice the contact seat area of the ball. When the shock pressure behind any ball exceeds 2 x the line pressure, the ball is unseated and the fluid escapes to drain. As the unseating pressure is greater than the line pressure, this feature will act as a spring or hydraulic cushion to absorb any shock. Since these balls are moved (almost instantaneously) either into a seating position or moved out of the way for fluid passage, there will be practically no cutting of the seat by high velocity fluid under pressure. (208)

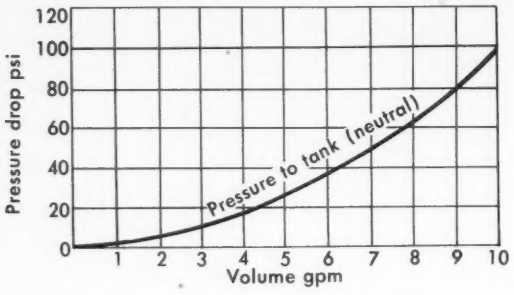
Fuse: it breaks a circuit in two ways

Under the trade name Supraflux, boric-acid is used to enclose the centre pocket of the **Bepco Canada Ltd.** Aeroflex Form I dual element HRC fuse. The centre pocket is used to give the extra time lag to the fuse. It has been found that a plain alloy slug does not always give trouble-free service, because collapse of the metal on melting is not always ensured.

A patented process enables the eutectic alloy centre pocket to be enclosed in a casing of boric-acid. Heat generated by the passage of an overload current passes along the perforated necks into the centre pocket. The inner face of the boric-acid casing softens before the alloy melts. When the alloy becomes molten, it scatters into small globules, due to surface tension and the electro-magnetic forces created by current flowing through it. These globules are absorbed by the boric-acid which acts as an insulating flux. The circuit is thus broken in two ways; by physical separation of the alloy into globules and insulation of each globule by the boric-acid. (209)


Area inside dotted line forms molten dielectric prior to melting of alloy
Copper strip
Before
Metal alloy
"Supraflux" casing
Alloy has melted and formed pellets embedded in "Supraflux" giving physical and electrical isolation.
After
Section of centre insert

Hydraulic valve: six can be stacked in series



A series of manually-actuated directional hydraulic valves with ranges up to 6000 psi have just been announced by **Dynex, Inc.**

With a flow capacity of 6 to 10 gpm, the valves can be stacked from one to six segments in a series and operated on a new slide principle that (it is claimed) reduces leakage to about one fifth that of comparable spool valves.

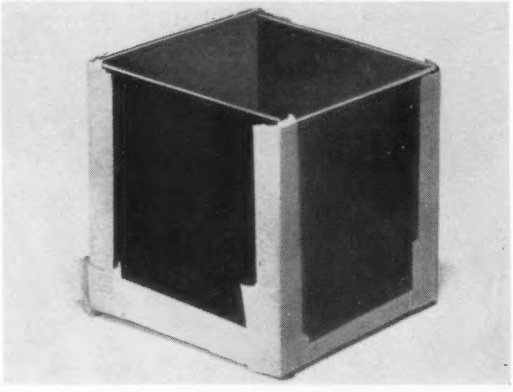
The valves which are competitive cost-wise with conventional spool valves, are open center and neutral with the spring centred "raise-hold-lower" operating positions. (210)

Epoxy sheet: ideal for very short runs

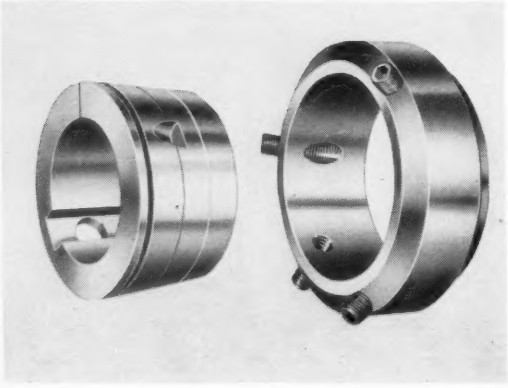
The development of molded epoxy resin sheeting that may be used by the engineer to fabricate his own special epoxy shapes is announced by **Epoxy Products, Inc.**

When heated to only 125 F, the sheeting can easily be cut with shears and formed into any rectangular shape. By using masking tape to seal the edges, the shape is retained until the addition of the component and potting compound is completed. The formed case and component case are then sealed, resulting in a completely epoxy encased unit.

The sheeting is especially useful where the engineer wishes to produce a model of the encapsulating unit prior to mass-production; or where very short runs do not justify the mass-production of an epoxy shell. In these (and countless other industrial applications) the epoxy sheeting will prove versatile, cheap and dependable. (211)



Hubs: adaptable to various shaft assemblies

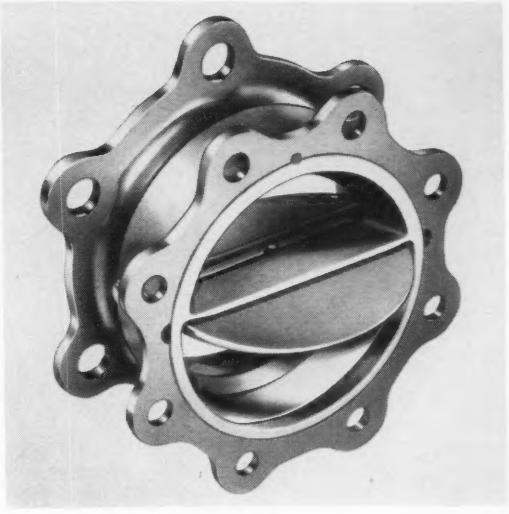


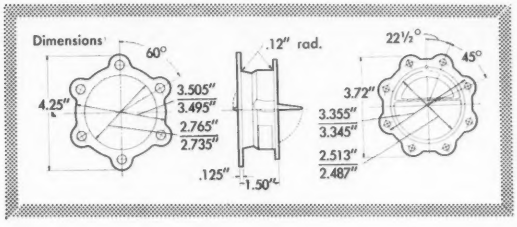
An all-steel Weld-On-Hub designed for foolproof assemblies of sprockets, pulleys, sheaves, gears, couplings and other industrial equipment has just been announced by the **Cullman Wheel Company.** It is said to be easily adaptable to various shaft assemblies, without any increase in the over-all length of the product itself.

When used with its companion unit (the steel split-tapered-bushing) there is no need for any type of special tool, wheel puller or jack screw for installation or removal. The Weld-On-Hub is provided with alloy steel compression set-screws that mount flush with the hub surface. The only device needed for installation or removal is an hexagonal head key. The split-tapered-bushings have precision ground diameters for perfect assemblies. The split construction provides for a full grip on undersized shafts. (212)

Pneumatic check valve: butterfly design in six parts

Designed to check rapidly reversing high temperature, high pressure air surges, this **Barber-Colman Company** 2½ in. pneumatic check valve combines ruggedness with simplicity. There are only six pieces in the valve. The butterfly design allows it to withstand forces caused by extremely rapid air reversals. A combination of ambient and internal temperature ranges of minus 65 F to plus 900 F, operating pressures up to 250 psi, and maximum internal leakage of 0.05 lb/min, make this check valve an outstanding component in air valves. It weighs less than 0.9 lb. Mounting flanges vary to suit applications. (213)





Fasteners: there's an O-ring in each grooved head

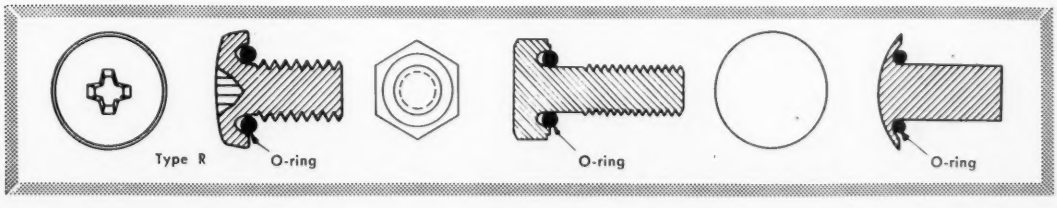
Made by **Automatic and Precision Manufacturing Co.,** Seelskrews seal out dust, fumes, moisture and other contaminants. They are designed with a groove under the head to accommodate a silicone rubber O-ring, compressed to form a vibration-resistant seal against any surface, regardless of finish. Space reservoir in the head confines the O-ring and permits full metal-to-metal contact. Seelskrews can be removed from equipment frequently and reused without affecting the sealing action. Stainless steel units are available from stock; they can be used with water, steam or hydraulic fluids, and will maintain sealing under both internal and external pressure up to 500 psi at temperatures from minus 160 to plus 500 F.

Seelbolts

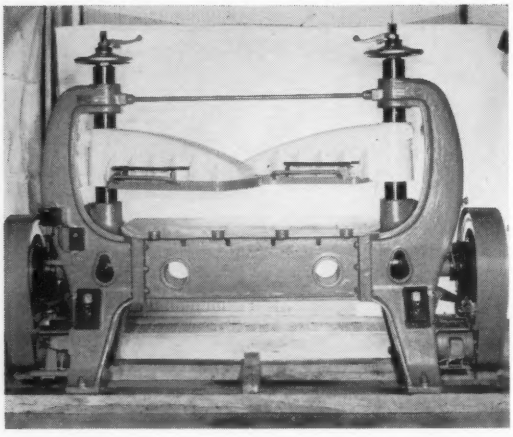
This pre-assembled hex-head fastener employs the same simple and dependable design used in Seelskrews. For high or low temperature applications within the range, minus 160 to plus 500 F, silicone rubber is the material used for the O-ring. However, Buna N or neoprene can be supplied for less critical applications. Standard bolts are of carbon steel, cadmium plated. Seelbolts will maintain their seal under 2,500 psi internal and external pressure. They have the exact dimensions of AN bolts and meet all requirements of MIL-B-6812A.

Seelrivets

The silicone rubber O-ring effectively seals air, gases and fluids at low or high pressures. Seelrivets are identical in appearance with conventional rivets, but a permanent seal at the rivet head is obtained. Standard rivets are universal head, furnished in aluminum alloy for aircraft applications and they have the exact dimensions of AN470 rivets. They will meet the requirements of MIL-R-5674A. Other types and materials are available on special order. (214)



Clicking machine: twin beams with ample overlap



Apart from a full range of single beam clickers, solenoid operated and unsurpassed for high production cutting on either long or short runs, there is now available the **Bata Engineering** Twin, Series H.D. This model can be supplied with either a 55 or 57 in. x 20 in. cutting table and the 20 in. wide beams, with ample overlap, give 100% coverage of the cutting area. The 2 hp electric motors provide the motive power, and consistent production-line cutting in multi-layer piles of plastic (up to 1¾ in. thick) can be maintained with ease. This machine will also cut rubber, plasticized fabric, nylon and, indeed, any substance that can be die cut in quantity.

The aluminum alloy beams (each beam produces an optimum thrust of 20,000 lb with a 1¾ in. stroke supplied as standard), coupled with its solenoid tripping mechanism, increases ease-of-handling to the maximum and decreases operator fatigue to the minimum. (215)

Eccospheres: they resemble fine white sand

Eccospheres are a new and significant low density, high temperature dielectric material now being produced by **Emerson & Cuming, Inc.**

They are thin walled, hollow glass microspheres ranging in size from 30 to 300 microns in diameter. In bulk appearance they resemble fine, white sand. In spite of the thin wall, compressive strength is high because of the essentially perfect spherical form.

The glass formulation is especially designed chemically to give the utmost in high temperature performance from the hollow formed eccospheres. Certain grades of the material are entirely stable at 1500 F. Some softening does occur at temperatures above 1000 F, but no permanent change is noticed until 1550 F is exceeded.

Tabulated properties are as follows:

Temperature stability	1200 F
Bulk density	10 lb/cu. ft
Dielectric constant	1.15
Dissipation factor	0.002

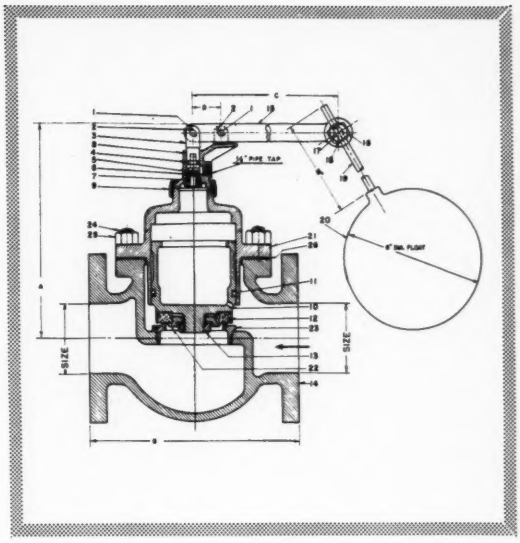
Eccospheres in formulated products are now being used in such diverse applications as microwave lenses for the Convair B-58 and Boeing B-52 and as skin insulation for the Boeing BOMARC. In addition, their use as a lightweight filler for cast epoxies is developing rapidly. High dielectric constant, low loss foam core material for high performance sandwich-type radomes is another rapidly developing field of use, minimizing bore-sight with greater strength-to-weight ratio. (216)

Float valve: liquid levels to within lin. limits

Auxiliary-actuated, Type 216-A globe type float valves permit control of liquid levels to within 1 in. limits in open or closed vessels. Of single seat design, the piston-operated valves (**Atlas Valve Co.**) provide tight closure for dead end applications. Operation is from a minimum inlet pressure of 15 psi to a maximum of 150 psi.

The valve is installed with the fluid entering the valve on the inlet side (as shown by the arrow). The liquid passes to the top of the piston through the part in the main valve spindle and forces the piston down, closing the valve.

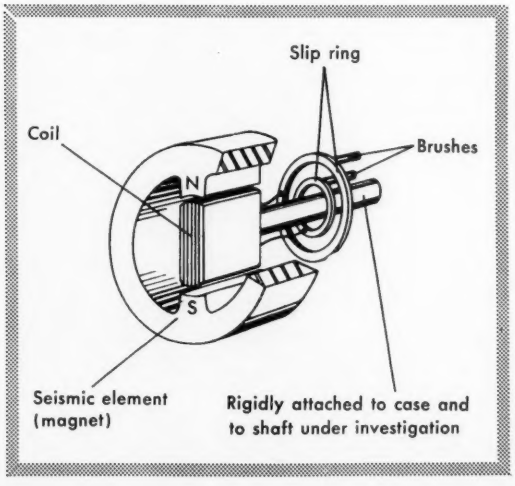
When the liquid level falls, the lowered float lifts or opens the auxiliary valve. This permits the discharge of pressure from the top of the piston faster than it can be maintained through the port in the valve spindle. This reduced pressure on the piston permits the pressure under the main valve to lift it from its seat and supply liquid to the tank. A distinctive feature of the valve is that the auxiliary valve does not have to move more than ⅛ in. to fully open or close the main valve. This makes very sensitive and accurate operation possible. (217)



Torsiograph: pickup can be mounted in any position

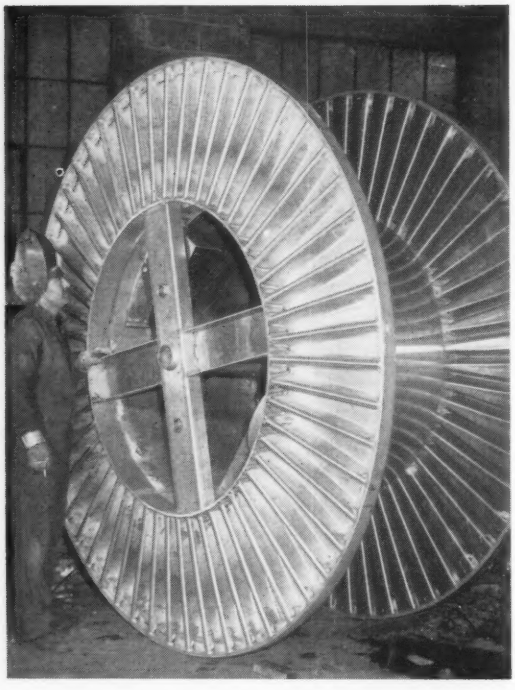
Consolidated's Type 9-102 torsiograph detects and measures the torsional vibrations of a rotating shaft.

The pick-up may be mounted in any position to measure accurately the torsional mode of vibration, even when superimposed on modes other than angular. The output voltage resulting from instantaneous shaft-speed variations may be fed to a vibration meter for the direct indication of relative angular velocity, amplitude and frequency; to a recording oscillograph for permanent recording when a detailed study of wave forms is needed; or to an oscilloscope for a dynamic study of wave forms as they occur.



An Alnico V magnet seismic mass (suspended on precision ball bearings) is restricted to angular displacement. Its strong magnetic field provides an elastic coupling to the case. Turns of an induction coil rigidly fixed to the case are linked by magnetic lines of flux between the seismic mass and the case; any relative motion between the two generates a voltage. The output value at any instant is a function of the instantaneous velocity of this relative motion. Solid-silver slip springs and dual sets of silver-graphite brushes assure conduction of the pickup-coil output. Because the ball bearings have no end play (and the silicone damping fluid acts as a lubricant) the instrument has excellent amplitude linearity and no tendency to stick at low frequencies and amplitudes. (218)

Cable reel: aluminum fabrication cuts their weight



The use of metal cable reels is on the increase, as is shown by two recent orders completed by **Argon Electric Welding Company Limited.**

This firm (a custom job shop specializing in heavy aluminum fabrication) has already made 300 of these 84 in. diameter aluminum reels. Each reel carries a 7,000 ft length of Alcan produced 1.38 in. diameter ACSR cable for the Hydro-Quebec Bersimis project. Tension stringing will be employed in Canada for the first time on this job and metal reels were necessary. The complete reel dimension is 84 in. x 35 in. by 48 in. traverse, made from Alcan B54S alloy sheet with a 65ST6 alloy I-beam tire. The empty reel weight is about 400 lb.

At the same time, 33 larger reels, measuring 104 in. x 56 in. by 40 in. traverse, were made for Northern Electric Company Limited (as illustrated). These have a weight of 835 lb and are of all welded B54SO alloy sheet, ¼ in. thick for the flanges, B54SH21 alloy 3/16 in. for the drum, and a Tee tire of 65ST6 alloy extruded section. The comparable weight of a wooden reel would be 2,370 lb. The lighter aluminum reel enables Northern Electric to ship larger quantities of heavy power or telephone cable on each one. Metal reels also permit better construction, allowing greater flexibility of use.

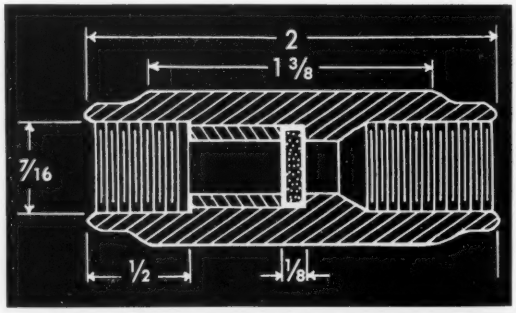
The more-than-adequate strength of the aluminum reel was revealed in tests on a prototype of smaller size. Due to design changes the production run reel is even stronger. (219)

Pressure snubber: two female pipe connections

A pressure snubber with dual female pipe connections has been introduced by the **Chemiquip Company,** makers of porous metal pressure snubbers and other gauge protection devices. Instead of the usual male and female configuration, the new design uses two ¼-in. NPT female pipe connections. It is made of stainless steel (for corrosion resistance and maximum strength) and may be used with low or high viscosity oils, water, steam and gases.

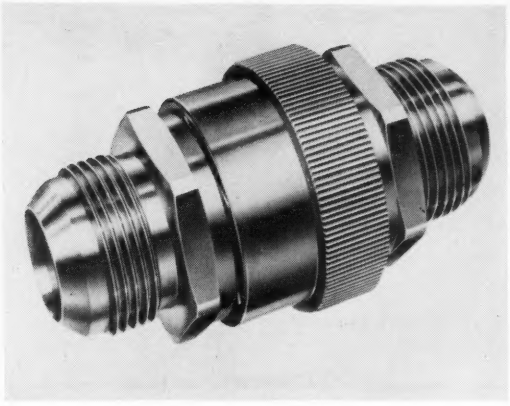
Capable of a maximum operating pressure of 20,000 psi, the snubbing element consists of a carefully calibrated disc of porous stainless steel. The extremely fine pores and large surface areas presented to the flow of material eliminates the possibility of plugging in service, even in the presence of high concentrations of solid inclusions.

The two female connections eliminate the need for a coupling or union, where the pressure instrument



and snubber are to be assembled to a piping system having a male connection provided for the pressure instrument. This reduces the number of threaded connections, of particular importance where noxious or toxic materials are present. (220)

Coupling: self-sealing for aircraft fuel systems



The new **Aeroquip** 3700 series self-sealing coupling is designed for use in aircraft fuel and oil systems (Specifications MIL-C-7413A) and low pressure hydraulic systems. The coupling combines compact, lightweight design with minimum pressure drop characteristics.

It contains opposed stem-guided poppet valves. Standard O-rings in the poppets effect a seat-seal. Thus, there are no internal sliding seals to cause sticking valves.

Two methods of connection are offered. A union nut with a sturdy quick-lead thread connects under pressure. Another union nut is available, featuring a simple push-pull action. Both styles connect easily with a simple one-hand operation and incorporate positive touch and visual lock indication.

The 3700 Series self-sealing coupling is offered in ¼ in. to 2 in. tube sizes and all end styles. (221)

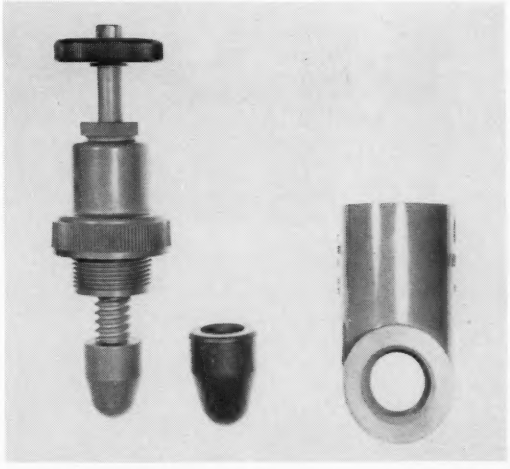
Gate valve: all-plastic for corrosives and abrasives

The **Vanton Pump & Equipment Corp.,** drawings on their experience as successful pioneers in the sealless plastic pump field (and their knowledge of stainless steel valves as a division of Cooper Alloy Corporation), announced the first all-plastic gate valve specifically designed to meet the problems of conveying corrosive and abrasive liquids in lines that cannot be chemically contaminated.

Vanton has combined in its design of this product (the "Flex-Plug" gate valve) the straight-through flow, non-pressure-drop characteristic of a gate valve and the throttling, flow-control feature of a globe valve, thus allowing for wide versatility of application.

The valve is immediately available in 1 in. and 2 in. sizes with screwed ends. The valve, offered in both PVC (rigid polyvinyl chloride) and styrene-copolymer, operates by the closure of a conically shaped plug with a resilient (and easily removed) synthetic cap on the inside of the body. When fully open there is no obstruction to fluid flow. When partially open, the developed curved design of the flexible cap and plug allows for minimum turbulence with throttled controlled flow.

With the flexible cap available in either Buna N, Neoprene or Hypalon (with Kel F elastomer for special applications) the valve is made up of all plastic materials, and this enables it to convey corrosives of almost any chemical character, as well as solutions that must be maintained free of contamination. The PVC line resists temperatures up to 140 F; the styrene-copolymer up to 170 F.



One of the design features is the resilient synthetic cap which can be removed quickly and replaced easily without removing the valve from the line. This reduces shut-down time to a minimum and cuts maintenance costs drastically. Further, wear of the resilient cap is at an absolute minimum, since the cap is flexible and seated on a swivel that is free to turn. In addition, because of the flexibility of the cap, the valve can handle slurries, despite their abrasive action. (222)

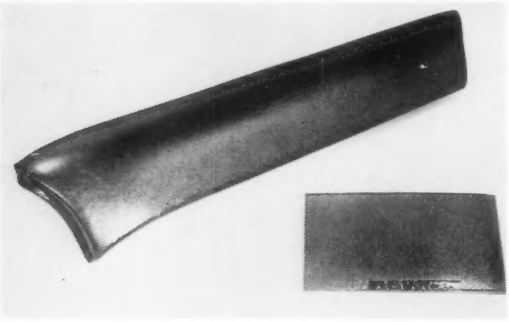
Strip steel; the surface is pattern-embossed

A new line of pattern strip steel was shown by **Acme Steel Company** at the Design Engineering Show.

It is cold-rolled with non-geometric patterns of free-flowing lines or shapes embossed into the steel.

Pattern strip is being widely used as decorative finish for cabinet hinges and door handles, mouldings, trims, electrical wall plates, interior and exterior strip for automobiles, fireplace fixtures and home appliances.

Since no tooling change is needed to use pattern strip instead of flat-surfaced steel, manufacturers have found it an inexpensive way to enhance the beauty of a product, simulate other materials (such as leather) or create an antique appearance. Some manufacturers use different designs of pattern strip to differentiate between models or to offer a variety of patterns that will harmonize with the product's surroundings.



The use of pattern strip minimizes the effect of surface scratches and die marks incurred during manufacture. It also minimizes fingerprints and handling marks after the finished product has reached the ultimate consumer.

Finished parts made from Acme Steel pattern strip can be painted or plated with any of the plating metals currently used on strip steel. The depth of the pattern can be controlled and is governed by the finish to be applied to the end product.

Eleven stock patterns are available. Any non-geometric pattern designed by a customer can be reproduced at a nominal charge.

Pattern strip is available in either bright or matt finish as thin as 0.015 in. and as wide as 24 in. Pattern strip is also available pre-painted to customer's specifications in gauges up to 0.035 in. and as wide as 10 in. All pattern strip is rolled to a customer's specific dimensions, tolerance and hardness. It is available in coils or cut lengths. (223)

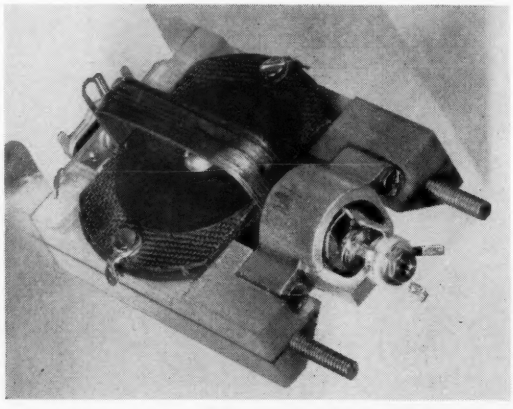
Wattmeter: big feature is its locking contact

Direct monitoring and control of electrical power by a single instrument is possible with a locking contact wattmeter developed by **Assembly Products, Inc.**

With the locking feature (believed to be the first ever built into a wattmeter) high and low limits of wattage can be preset, so that control action is initiated when a limit is reached. As with Assembly Products' meter-relays, limits are set by pointers that may be turned easily anywhere on the dial. Control action may be any of a number of forms.

Previously it has been necessary to control wattage less accurately by controlling either current or voltage. Possible variations in the factor not being monitored may significantly complicate control of wattage, however.

The new instrument was designed by adding a core magnet movement (as used in VHS meter-relays) to the movement of a standard dynamometer-type wattmeter. The VHS-type movement is on the same plane as the voltage coil of the wattmeter, and moves with it as it turns within the field of the stationary current coil.



When the power being used reaches a preset limit, a contact on the indicating pointer touches a contact on a fixed pointer. A circuit is closed to an external slave-relay that triggers control action. (224)

Testing device: it rates ballbearing performance

A 17-lb electronic testing device that quickly determines performance qualities of oil-lubricated, instrument-size ball bearings, has been developed by **The Barden Corporation,** manufacturer of precision ball bearings.

Known as the Smooth Rator, it was designed and developed for the functional testing of bearings before shipment to customers. It is, however, now being used as a production tool (by manufacturers of high quality instrument systems) for pre-assembly performance checks and for diagnosing bearing malfunctions.

The tester, which has an average hourly production rate of 60 to 100 bearings, provides an over-all check on quality by revealing the vibrational characteristics of bearings.

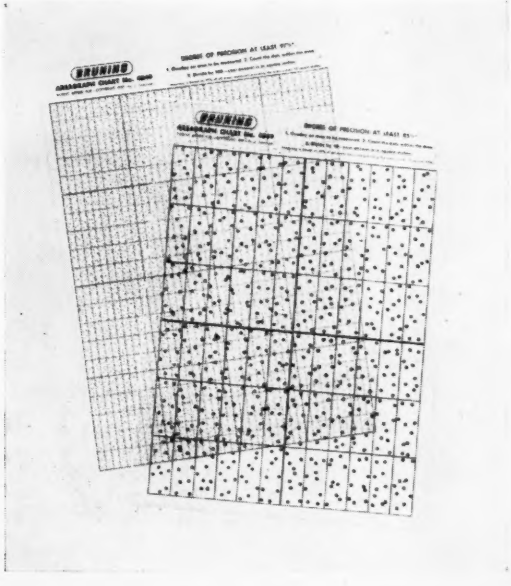
Although it is not a torque tester, the Smooth Rator produces test results that realistically indicate the usefulness of bearings for exacting gyro gimbal, synchro and other low-torque applications. Where low noise or vibration levels are required, test results are impersonal, reliable guides to bearing performance in completed assemblies. (225)

Area-finding: cheaper and faster than a planimeter

A new method of performing the same basic functions as a planimeter, but considerably faster and at a fraction of the cost, has been introduced by **Charles Bruning Company (Canada) Limited** under the trade name "Areagraph." It's a cheap method of quickly (and accurately) measuring irregularly-shaped areas on drawings, charts, photographs, maps and plane objects.

Areas are easily measured by placing an overlay (a transparent film printed with a pattern of grids and dots) over the area to be measured. The dots falling within the area to be measured are counted, and then divided by a simple factor printed on the overlay. The answer is in square inches.

The method is accurate because the dots are located in accordance with a statistical method that is mathematically correct. The overlays are easy to use; anyone can, in fact, use them after only a few minutes' instruction. A skilled technician is not needed. They are available in sets of three, one chart for each of three predetermined degrees of accuracy, 85%, 90% and 97%. The overlays are made of durable, highly dimensionally-stable Du Pont Mylar polyester film. Areagraph overlays give long service without tearing, distorting or discoloring. The grid lines and dots are protected by wear-resistant varnish. (226)

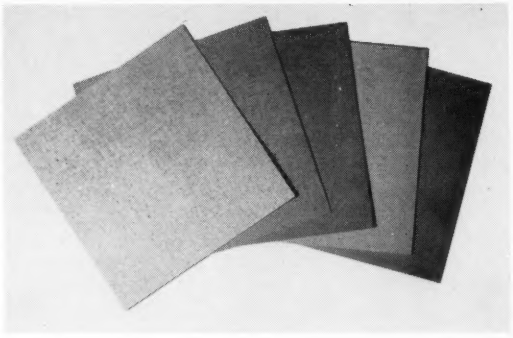


Laminate: it puts a vinyl coat on metals

A vinyl-to-metal laminate, known as Laminol, has been introduced by **American Nickeloid Co.,** manufacturer of pre-finished metals. The material consists of tough vinyl sheeting permanently adhered by pressure and heat to one side of a metal base of steel or aluminum. Thus it combines the strength, rigidity and impact resistance of metal with the beauty, color and texture of vinyl.

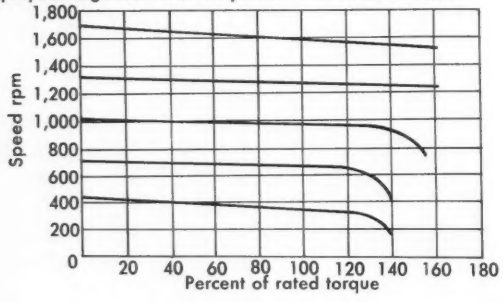
The color and surface embossing are stable and the material highly resistant to abrasion, impact and staining. The vinyl does not affect the basic fabricating properties of the base metal. It may be deep drawn, bent, punched, roll formed, crimped and so on with standard production techniques, without separation of the laminate or damage to the surface. It is expected to find wide application for appliances, television and radio cabinets, luggage, furniture, store fixtures and business machine housings.

Laminol is available in steel or aluminum base; in sheets up to 32 in. x 144 in., coils up to 32 in. wide and in all popular gauges and tempers. A wide range of vinyl color, texture and thickness is available. (227)



Tailored drive: a host of features can be included

Speed-torque curves of 5 hp VarEPack drive with general-purpose regulator and with current-limit-feature added.



VarEPack is an engineered drive whose regulation, efficiency, range and speed of acceleration and response (among other characteristics) can be tailored to the requirements of the application.

Examples of features that can be included are: reversing, braking, current limit, timed acceleration and deceleration, special enclosures, various speed ranges, several methods of speed sensing and indication, and several methods of regulating and control.

For speed sensing, the equipment may use an impulse generator, an a-c or d-c tachometer, or motor secondary voltage or frequency.

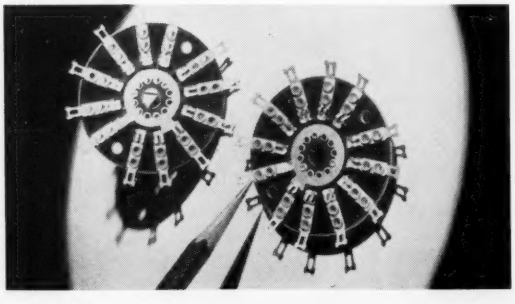
Regulators also use magnetic amplifiers, vacuum tube or transistors. (228)

Rotary switch: phenolic section construction

A double eyelet phenolic section construction is now available for **Centralab** Series 275, H-type rotary switches.

The construction insures extreme rigidity under the most rugged commercial and military applications. Switches using these sections are designed to meet military requirements.

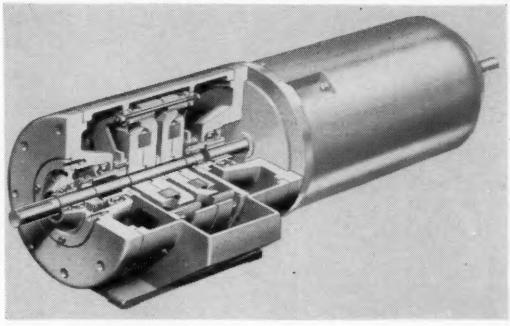
Series 275 has its primary use in hand change and tap switch applications. It is available in production quantities in switches containing up to 12 sections. The double eyelet sections have 1 9/16 in. mounting centres and are interchangeable with units designed for these centres. (229)



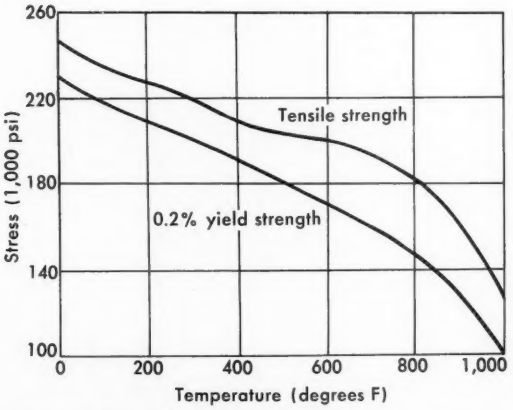
Drive: variable speed from a constant speed source

An infinitely variable-speed drive, using constant-speed motors, made its first public appearance at the Design Engineering Show. Designed around the well-known eddy-current principle, the patented drive has been under development for several years by **Cone-Drive Gears.** Four drip-proof models in six different sizes are available. Models include a separate controlled-slip coupling and various combinations to serve as: (a) variable-speed gearmotor; (b) variable-speed motor and (c) special unit for integral mounting of speed reducers. They will handle motors up to 150 hp at 1750 rpm. Maximum torque transmittal is 450 ft lb. Direct current power supplies are not required.

Advantages of the Marvex drive are many. It provides an infinitely variable speed drive from a constant-speed source. It eliminates costly motor-generator sets. There is no mechanical connection between prime mover and load. The unit is therefore shockproof since the only coupling is a magnetic field. Load can be engaged or disengaged electromagnetically without stopping the prime mover. The use of mechanical clutches is eliminated. (230)



Stainless steel: strength up to 1,000 F



PH 15-7 Mo is a high strength, precipitation-hardening stainless steel designed to withstand the heat generated by high speed aircraft and missiles. It is a modification of **Armco Steel Corporation's** 17-7 PH, which has been used in aircraft and missile applications since 1948.

The new steel offers extremely high strength at both room and elevated temperatures up to 1000 F. At the same time it maintains other features that make 17-7 PH so popular for aircraft applications: ease of fabrication; good corrosion resistance; relatively low cost; and ready availability in all standard forms and sizes.

PH 15-7 Mo is supplied by the mill in a soft annealed state, referred to as Condition A. In this condition, it can easily be formed and joined by any of the usual methods of the metal working industry. It is readily formed, drawn, spun, forged, welded and brazed. In such operations the alloy behaves very much like annealed AISI Type 301 stainless steel. After fabrication, PH 15-7 Mo is heat treated to its high strength levels.

In the fully heat-treated conditions (RH 950 and TH 1050) PH 15-7 Mo possesses outstanding elevated temperature properties. As shown by the graph, an ultimate tensile strength in excess of 200,000 psi is maintained from room temperature up to 600 F. Throughout the elevated temperature range to 1000 F the yield strength is exceptionally high.

For a given strength per unit of weight, PH 15-7 will equal or exceed the properties obtained in the new heat-treatable titanium alloys.

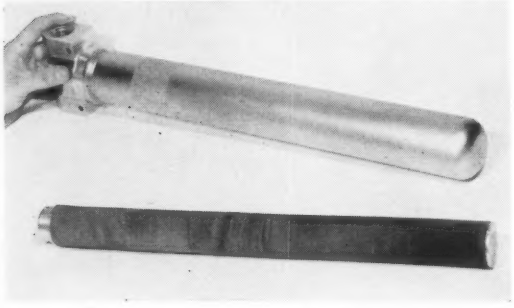
Although particularly suitable for parts made from sheet, strip and foil, it is also commercially available in the form of plate, bar, wire and forging billets. Extrusions are being developed.

Most applications for the alloy to date have been in the aircraft and missile industry. It is being used (or considered) for such items as honeycomb core and skins, solid rocket cases, welded fuel tanks and other pressure vessels, forged rings and bulkheads, ribs, stringers and other aircraft structural parts. (231)

Filter: for fuels, oils, air, gases and solvents

Filters for removing particles as small as two microns (0.000078 in.) in size from hydraulic fluids are now available from **Aviation Electric Limited.** Designed for aircraft and missile ground service equipment and test stands, the filters provide controlled hydraulic fluid filtration to a 2 micron particle rating and have an absolute filtration of 5 microns. Fuels, lubrication oils, air, gases and solvents can also be handled by these filters.

The filters consist of an aluminum alloy head attached by screw threads to an aluminum bowl, a long spring-loaded filter element made up of an assembly of Bendix plastic washers, and suitable filter retaining spring and O ring seals. The filter elements are noncorrosive, easily cleaned and restored to original filter capacity, they operate in a temperature range from minus 65F to plus 275F.



Filter	Weight	Length
10 gpm	8.2 lb	28 in.
7.5 gpm	6.5 lb	22 in.
5.0 gpm	5.3 lb	16 in.

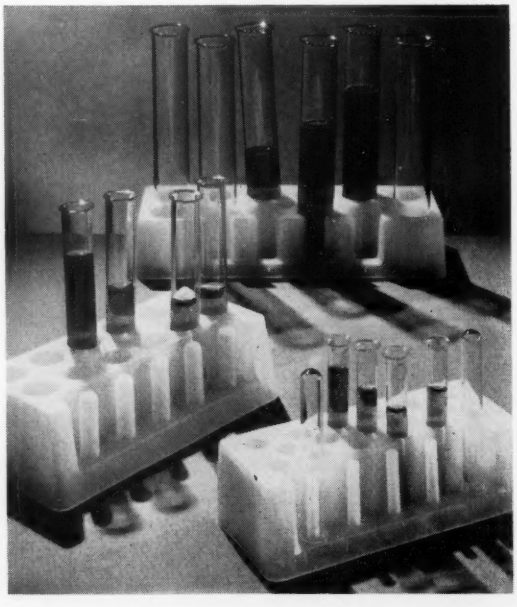
Fluid flow in the filters is from the inlet port in the filter head to the bowl. Flow in the filter element is from outside to inside, through extremely small spaces formed by the surface roughness between adjacent washers. A long flow path is maintained in the filter element. The minimum flow path is more than 3,000 times the rated pore size, thus preventing penetration of needle-shaped particles. From the centre of the filter element, the fluid flows up and out of the outlet port in the filter head.

Bendix 2-micron hydraulic fluid filters are currently available in three sizes rated at 10, 7.5 and 5 gpm flow rates (see Table). All filters have the same 4 x 3 in. filter head and a 2½ in. OD bowl. (232)

Test tube rack: polyethylene molding cushions the glass

Three sturdy new racks molded of **Eastman** Tenite polyethylene make highly satisfactory holders for laboratory test tubes. Each of them is designed for a different category of test tube sizes, from semi-micro to the very large. The largest model (shown here in the background) will also accommodate large centrifuge tubes, dropping bottles and vials. Deep pockets hold the test tubes upright to prevent tipping or spilling. The two smaller racks have a row of studs at the front, over which clean test tubes may be inverted and kept ready for immediate use.

In addition to being well-nigh unbreakable, the polyethylene racks have a relatively soft surface, which is cushioning to the glass containers. Moreover, the racks resist dirt and stains and can easily be washed clean. (233)



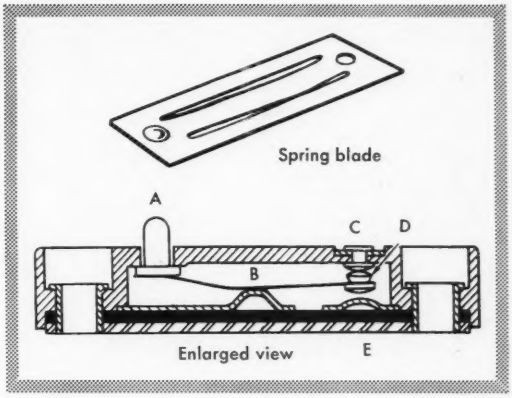
Switch: stamping gives positive snap-action

The basic Tyni-Switch design **(Detroit Controls Corp.)** produces positive, clear "break" and virtually bounceless "make."

The spring mechanism is a single stamping, processed to give a positive snap-action. The elimination of connecting elements in the spring design provides a high contact pressure, making possible a high switch rating in a relatively small space.

Pressure applied to pin plunger A is transferred to spring blade B. When the actuating pressure on A exceeds the resistance of B, the free end of blade B snaps down at high speed, breaking contacts C and D, and making contacts D and E.

When pressure on pin plunger A is released, blade B returns with a snap (again at high speed) to its normal position, breaking contacts D and E and making contacts C and D. (234)



Stainless valve: casting them six at a time

A cast stainless valve, now in use with the Atlas intercontinental ballistic missile, has met rigorous specifications, at a cost that is 30% less than the original weldment design. Even more important, the casting has overcome objectionable features inherent in the weldment.

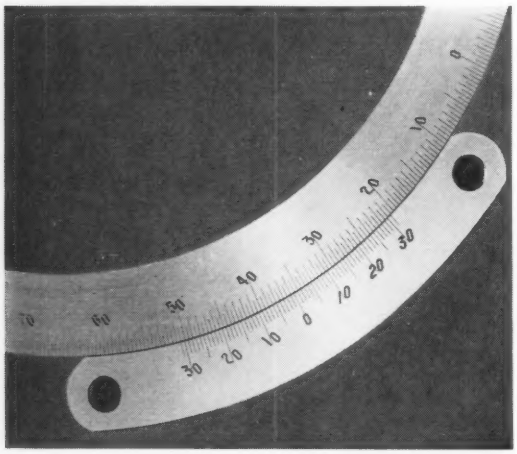
As originally designed, the valve consisted of welded wrought stainless steel flanges and tubes. From both the economic and engineering points of view, however, this design was unsatisfactory. First, machining and welding costs were high, second, since weld zones are susceptible to intergranular corrosion, mechanical failure was a possibility. Furthermore, the welded seams offered an opportunity for gas leakage, and it was feared that they might not withstand the severe mechanical shock.

In selecting a suitable cast alloy, the designers had available to them about 20 **Alloy Casting Institute** types in the corrosion-resistant category. Type CF-8 (corresponding to wrought type 304) with 19% chromium, 9% nickel and a maximum of 0.08% carbon was chosen. This alloy, in addition to providing excellent resistance to corrosion by oxidization, has exceptionally good shock resistance (impact strength) at sub-zero temperatures.

The valve bodies were made by a modified centrifugal casting technique permitting the casting of six 180 lb valve bodies at one time, thus decreasing the production cost per unit. Because of the one-piece cast design, the danger of gas leakage is practically eliminated. (235)

Sterling silver: excellent for scale engraving

The same properties of easy workability that have been prized by silversmiths for centuries make sterling silver equally useful for applications in precision instruments. A good example is the 6¼ in. horizontal and 5 in. vertical circles in the engineer's surveying transits made by **Eugene Dietzgen Co.**, manufacturers of drafting materials and surveying equipment.



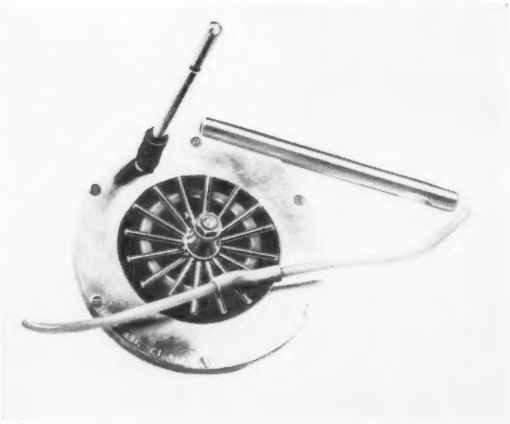
The calibrated circles shown (they indicate angular azimuth and elevation) consist of a cast-bronze base surfaced with an 0.035 in. thick ring of sterling silver, on which the scale markings are engraved. The silver, (supplied by Handy & Harman) is furnished in the form of a flat ring which is soldered with 50-50 solder to the face of the casting. Before the scales are divided and engraved, the assembled circles go through a series of operations, which include machining the silver face and bottom bearing surface of the casting to ensure parallelism, and machining the circles to proper ID and OD.

Dietzgen uses sterling silver for the scale surface for two reasons: its excellent engraving qualities; and its fine surface finishing properties, which make the scale easy to read and easy to refinish when necessary after years of service.

The excellent engraving properties of sterling silver result from a favorable balance between ductility and hardness. This permits precise engraving without the tearing or severe burring generally experienced with brass and many soft steels. The silver used has a Rockwell 15-T hardness of 86-91. The scale markings are engraved to a depth of 0.025 in. and are 0.0025 in. wide. On the 5 in. vertical circle, approximately 46 lines are scribed to the inch. (236)

Pinch clamp: operates as a pump or meter

The illustration shows **Corneil Associates** Model OH-L Kinetic-Clamp. A loop of tubing lies on a rubber faced platen beneath a hub having a series of spokes or presser bars which are inclined away from this hub. The hub is journalled on a shaft having the axis of that portion within the hub inclined away from the axis about which it is forced to rotate, so that one spoke or bar fixed to the hub is brought parallel to the platen at any position. This bar acts as the presser bar in a simple laboratory pinch clamp used to pinch off a flexible tube or to produce an adjustable orifice. All the other bars are inclined away from the parallel radial position so that the tubing is permitted (at least in part) to approach its normal cylindrical shape. The ends of the tubing are brought up between an adjacent pair of bars and are drawn through a sleeve which fixes the diameter of the loop without restraining the cross-sectional area of the tube. (237)



Potentiometer: the shaft is self-aligning

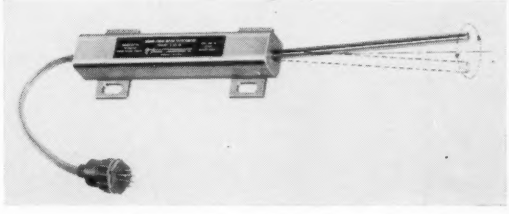
A linear motion potentiometer (developed by **Bourns Laboratories**) has a self-aligning shaft which makes possible the measurement of linear displacement, even where perfect alignment with an actuating member is impossible. The design eliminates side loads on the shaft and simplifies instrument installation.

The new instrument (Model 156 Align-O-Pot) has a floating shaft which permits a wide area of movement for the actuating member. Thus, bending loads and vibratory motion on the shaft are eliminated. The floating shaft is securely connected to the wiper assembly, which is internally supported throughout the entire length of travel. Multiple contacts ensure reliable performance.

Model 156 has excellent vibration and noise characteristics. Vibration error is less than resolution at 15 g for travels of 2½ in. or less and at 25 g for travels from 2½ to 4 in. It is available in travels ranging from ½ to 6½ in.

Single or dual potentiometer outputs are available, in resistance values of 1, 2, 5, 10, 20 and 50 K. Operating temperatures range from minus 67 to plus 221 F, with ranges to 450 F available. Acceleration error is less than resolution at 100 g without noise.

Resistance to shock at 50 g conforms to MIL-E-5272 A, Procedure I. Humidity specification is 95% RH at 40 C for 100 hr. (238)



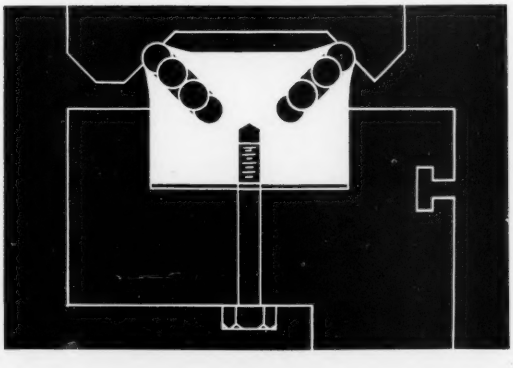
Ball ways: for horizontal sliding tables

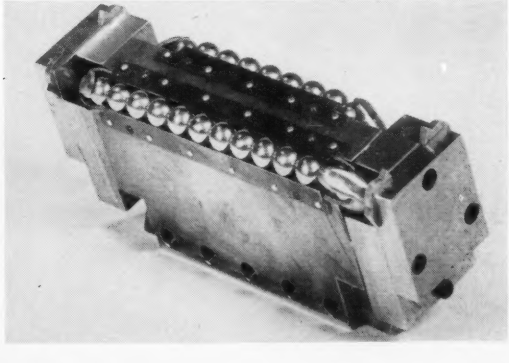
Beaver ball way cartridges (manufactured by **Beaver Precision Products Inc.**) are now being employed to eliminate breakaway friction on horizontal sliding tables and other machine tool parts.

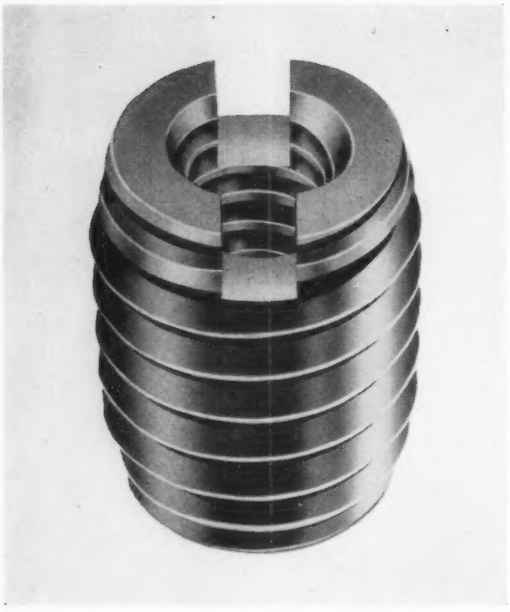
The resistance to starting motion, encountered in the traversing or reciprocating action of heavy parts, is described as "stixion," a word the industry has coined from stick-slip friction. While ball and roller type ways have been used in the past to contend with stixion, they have generally been of the rolling "caged" type which must be 50% longer than the table.

These cartridges are attached to (and made a part of) the moving unit. The balls are recirculated within the cartridge just as they are recirculated within the nut of ball screws. The number of cartridges used depends on the length and weight of the moving part and the support needed.

The high efficiency of Beaver ball way cartridges improves the performance of the machine, increases sensitivity of control and lends itself better to preloading, since they are fixed in the moving part and can be adjusted for maximum system stiffness. (239)







Brass insert:

it functions as a

wood or tapping screw

An interesting double-duty insert designed for wood applications (such as for attachment of television and radio cabinet legs and fastening of wood furniture handles) comes from the **Groove-Pin Corp.** The large outside diameter of the insert increases its tensile strength to the maximum practical application of wood fasteners. Its double-duty talents stem from the fact that it is designed to function either as a wood screw or a tapping screw. For soft woods and applications in end-grain, the unslotted end (which has a pilot) is the entering end and embosses the threads in the wood in the same way as a wood screw. In hardwood, the slotted end enters first with the slot acting as a tap partially cutting and partially thread-forming its own threads. The insert is of brass. (240)

Needle valve:

for pressures

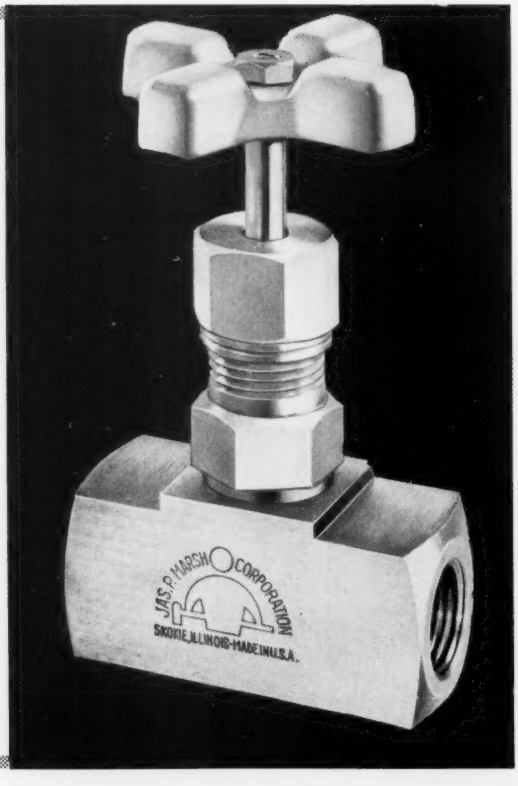
up to 10,000 psi

From the **Marsh Instrument & Valve Co. (Canada) Ltd.,** comes a new 416 stainless steel needle valve. Designed for corrosive service, the valves are suitable for pressures up to 10,000 psi.

The packing is precision-molded Teflon, tailor-made for the particular packing system. Being the most inert packing material known, Teflon provides an ideal packing for use on all types of destructive materials. It is claimed to be leaktight, free from binding and readily replaced. It operates in all temperature ranges from —100 F to + 500F.

Valve bodies and valve stem guides are machined from solid 416 stainless steel bar stock. The valve stem is hardened 416 stainless steel precision machined with pitch threads for fine regulation.

The cross-type handle is of malleable iron and finished in heavy baked enamel. (241)



White enamel: radical improvement in organic finishes

An interesting new enamel coming from the **Glidden Company Limited** is their TGL 9663 intended primarily for use by the "white goods" manufacturers, that is to say, refrigerators, stoves, washers and so forth.

The enamel is a radical improvement in organic finishes. The following evaluation results are based on intensive and careful testing performed by the Glidden people themselves;

Film characteristics

Bake 30 minutes at 325 F. Metal preparation—Bonderite 1000.

Gloss	90 deg. on 60 deg. Glossmeter
Hardness (pencil)	4H
Impact, reverse	14 in. lb.
Impact, direct	28 in. lb.
Flexibility (conical mandrel)	1 in. crack visible only under 10X magnification
Adhesion crosshatch	100%

Application

Catalyze with TL-7957 added at the rate of two fluid ounces per gallon. Mix well and reduce 20% with Xylol to a reduced viscosity of 24±1 secs. No. 4 Ford cup.

Hat spray at 140 F.

Cold spray may be used for film thickness of less than 1½ mils.

Over 1½ mils cold spray will induce popping.

Test results

Oven aging 240 hrs. at 250 F.

Impact, reverse	28 in.-lb.
Impact, direct	28 in.-lb.
Conical mandrel	No cracking

Color master reading

Before aging		After aging	
Blue	76.94	Blue	74.86
Green	74.80	Green	74.72
Red	74.16	Red	74.32
Y =	.0374	Y =	.0072

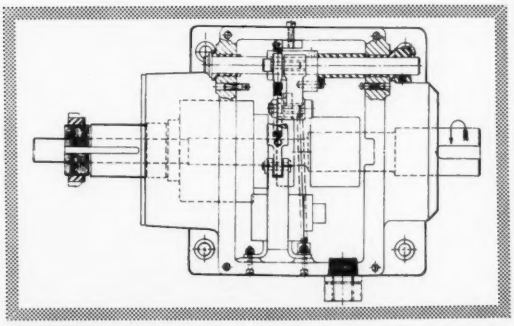
Color change DY = 0.0302

A good conventional refrigerator enamel would show a yellowing factor about ten times the magnitude of the above.

Hardness (pencil)	4H unchanged
Adhesion (crosshatch)	100% unchanged

(242)

Intermittent drive: designed as a package unit



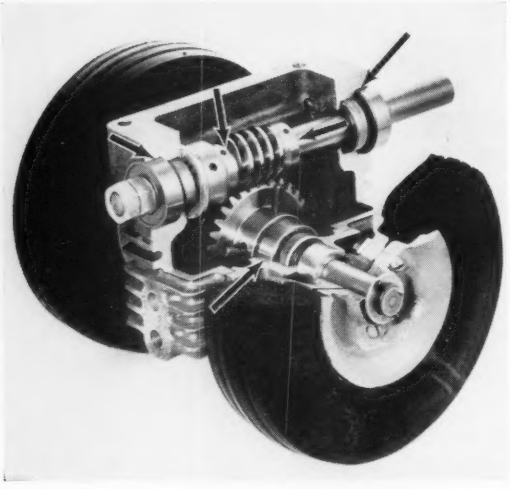
The Hilliard Corp. has long been marketing a single revolution clutch for obtaining intermittent output from a constantly rotating source. However, it has been up to buyers to design the clutches into their equipment, as well as to design and procure the necessary trip levers, brackets, brakes, solenoids and so forth. When the number of machines produced is small (less than five, say), the result has been comparatively high cost to the user.

Hilliard has now developed an intermittent drive unit which can save the user much of this additional expense and, at the same time, simplify the designer's work in instances where manufacturing quantities are relatively small. The unit is a self-contained and completely enclosed package designed for easy mounting and connection to both input drive and control means.

There are accessories available for different types of input drive connections and also a crank arm for the output shaft connection. Electrical cycle timers or mechanical program timers (or combinations of both) can easily be used to give almost any type of automatic control. (243)

Sealant: substitute for an interference fit

Press fits are often used on ball bearing installations so that the bearing races will not shift (or rotate) with respect to the bearing housing or shaft. This calls for precision tolerances on the shaft and housing bore. If the fits are too loose, the races will slip and rotate, causing fretting of the surfaces; if too tight, the inside race is stretched over the shaft and the outer race compressed in the bore, thereby shortening the life of the bearing.



In the bearings of a small gear box which drives the Parker turbo floor sweeper, the close tolerances led to many parts being rejected, and there were reports of bearing failures caused by cracked inner races. (The ball bearings are of the inch series, single-row radial with ⅝ in. bore.)

After a series of tests with Loctite sealant **(American Sealants Co.),** it was found that the shaft could be made 0.003 in. under the actual bore size of the bearing and still retain the bearing with a force equal to a customary interference fit of 0.003 in. This allowed the tolerances to be opened up by 0.002 in.

When sealant-treated, the housing can be 0.0035 in. oversize and still equal to an interference fit. These tolerances are being used for all the bearings.

Loctite is a penetrating liquid polymer that hardens after being confined between closely fitted metal parts. Catalytic action of the metal surfaces (aided by the absence of air) is sufficient to harden the sealant into a strong, heat- and oil-resistant bond. It has already found use as a liquid lock for threaded fasteners, as a sealant against porosity in welds and castings, and as a solder for certain types of joint.

The polymer is intended for shear rather than tensile stresses. It is available in five grades. Grade A (the type used here) has the best holding power—up to 1,000 psi. (244)

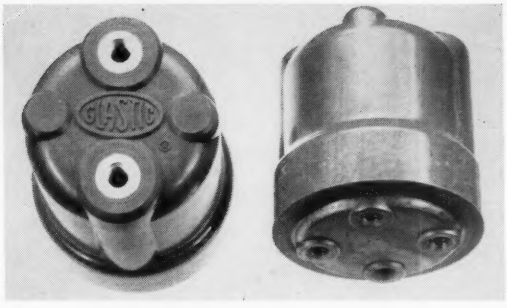
Refractory metals: their unusual properties let them work where others fail

Taken ten years ago, the photo illustration shown on this page could only have contained seven of the 67 items it now frames.

Through Fansteel Metallurgical Corp., tantalum, tungsten, molybdenum and columbium are available in the wide range of shapes shown.

Unusual properties permit these refractory metals to function where others fail. High strength and high temperatures, low vapor pressure, high density, corrosion resistance, low thermal expansion, high rigidity and the ability to absorb and hold gases are just a few reasons why these metals are being used for more and more applications. (245)

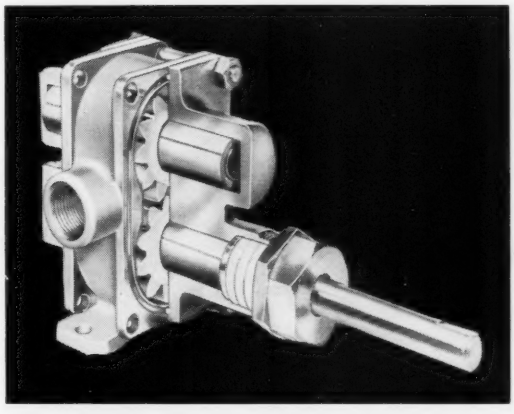
Insulators: a strong competitor to porcelain



Traditionally, the only material used in large insulators has been porcelain. **The Glastic Corp.** has now introduced a 5-kv insulator made of their glass fibre reinforced polyester plastic. These insulators would seem to have several advantages over conventional porcelain insulators, among them: lower cost, less weight, greater strength and resistance to chipping, greater dimensional accuracy.

Glastic glass fibre reinforced polyester insulators have behind them a performance record of several years service in a variety of large mill power control apparatus, where they function as bus supports and switch and contactor support insulators. (246)

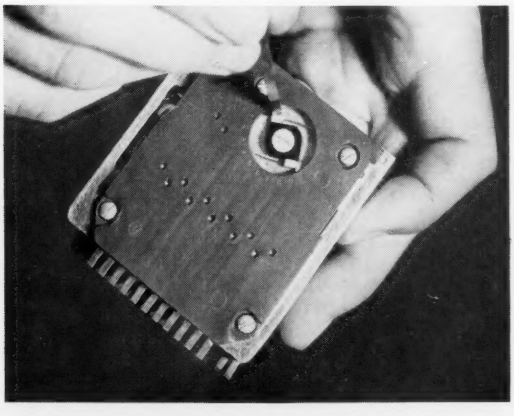
Gear pump: effective operation with viscosities to 5,000 ssu



The ¾-in. Gear Chem pump announced by **Eco Engineering Co.** yields 10 gpm at 1,750 rpm and operates effectively to 100 psi with a viscosities to 5,000 ssu.

Features of the new unit include ¾ in. ports; reversible teflon spur gears; internal teflon bearings and pump casting; and a shaft of pure electrolytic nickel. The unit can be supplied with complete motorized assemblies.

The flow accuracy is $\pm 1\%$, so that it is ideal for constant flow metering service. (247)

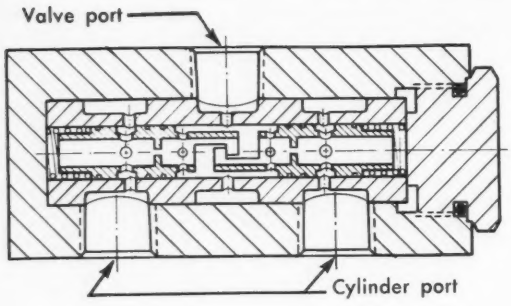


Brush assembly: cores in continuous chain

The Gries Reproducer Corp. has developed a unique insert-die casting, and insert-plastic molding technique. Using their experience on this, they were able to produce (for IBM) a brush assembly for an impulse counter in one piece. This involved redesign of an assembly formerly made in five pieces. Originally, the pieces were hand-assembled and then insulated with phenolic plastic.

In the Gries technique, the zinc alloy is die-cast around strands of music wire, making a continuous chain of cores; the strand and bridge unit becomes the "insert" for the nylon molding operation. The operation is completely automatic from start to finish. (248)

Flow divider: a sliding spool does the equalizing



Designed to divide the flow from a single pump into two equal parts, this device (from **Fluid Controls Inc.**) has a claimed accuracy of within 10% of total flow. Reversible, the flow divider can be used to combine two flows into one with the same degree of accuracy.

The flow divider operates as a pair of pressure compensated flow regulators to keep pressure drop across two orifices equal. As flow increases through one of them, the pressure difference between the two makes a sliding spool shift over the orifice and equalize the flow.

Available in two sizes, the flow-divider is equipped for ⅜-in. pipe size and is designed for 2,000 psi working pressure. (249)

Generator: first of its type

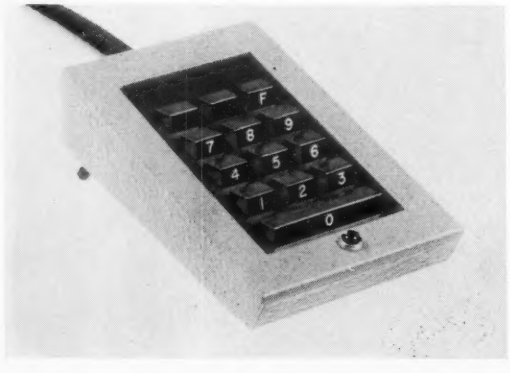
Lucas-Rotax is now making an ac generator which the company claims to be unaffected by the environment conditions commonly associated with aircraft service. To overcome problems in sliprings, commutators and brushgear, this new generator uses silicon rectifiers located within the rotating shaft. Sliding contacts are thus eliminated and brushwear (often limiting the over-all and servicing life to 500 hrs.) is no longer a problem.

Additionally, radio interference caused by brushes is entirely absent. During flight conditions, temperature and pressure of air varies considerably. Oil cooling has provided an answer to these problems.

This is the first unit of its type in Canada. 40 kva of power is provided continuously and, when it comes to overloads, the unit has plenty in hand—80 kva can be punched out at nominal voltage when the need arises.

The 5-lb control unit has no moving parts and can respond instantly to every change. (250)

Keyboard: manual input for electronic equipment



After a proven five-year reliability record as the manual input for their own electronic data processing equipment, the ElectroData division of **Burroughs Corp.** is now marketing their decimal keyboard.

Designated model 410, the keyboard will give rapid manual digital input to a variety of devices — among them, plotters, computers, paper tape preparation units, control equipment and the like. Retailing at $145 per unit (this is the U. S. price and may be different in Canada) it contains 10 decimal and three optional assignment keys. Each of its key-operated, single-pole, double-throw switches has three taper pin terminated leads for flexibility in terminal strip installation. The 3-ft., 41-wire cable includes leads for the power indicating light at the base of the keyboard. (251)

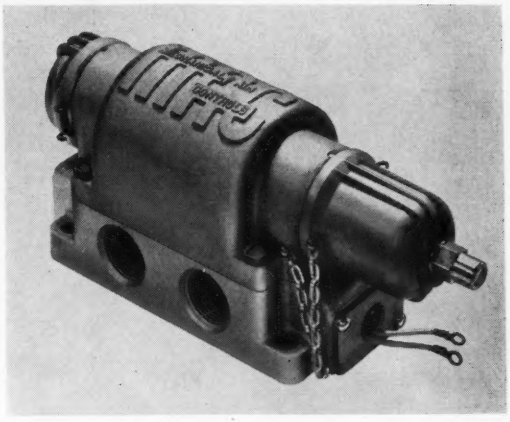
Air valve: a spool-within-a-spool design cuts size

According to the manufacturer **(Mechanical Air Controls, Inc.)** their dual-spool circular-flow air valve sells for about half the price of most other ½-in. to 1¼-in. valves. On this claim alone the valve is worthy of the attention of our readers.

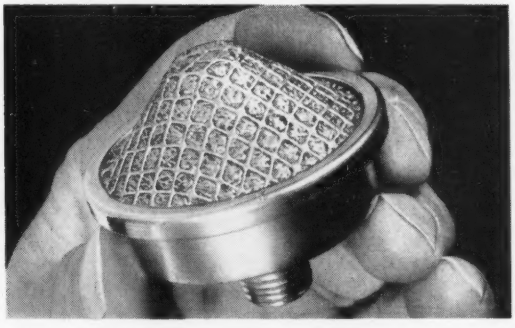
Designed around a spool-within-a-spool, the valve has a short stroke, direct operation and circular air flow. They are also claimed to be about one-half the size of similar competitive valves.

The inner spool operates through the core of the outer spool. The solenoid energizes the inner spool, releasing compressed air to activate the outer spool. There is no lag between movement of either spool.

The shock load of the main spool is dissipated through rubber cushions located at spool ends. For safety's sake, the valve is electrically inoperative with the cover off, and the solenoid and cover assembly detach in seconds without tools. (252)



Muffler: small unit cuts exhaust and intake noise



Available in various dimensions, compactness would seem to be the prime feature of this series of mufflers made by the **Air-Maze Corp.** High noise levels can be effectively reduced by the addition of one of these units to all air exhaust or intake pipes.

The shock waves that are created when exhausting compressed air to the atmosphere are broken up to attenuate objectional noise and the manufacturer claims that there is no noticeable fall-off in the mechanical efficiency of air-operated equipment (due to back pressure).

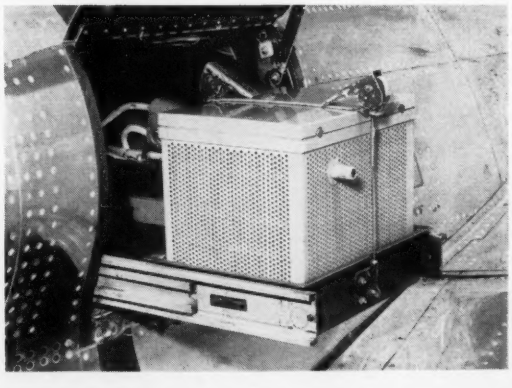
The units are completely self-contained and will mount on any port or piping which has a standard thread. The element can be cleaned in any commercial oil solvent. (253)

Slides: accessibility is a big feature they provide

Industrial slides provide the engineer with the ideal mechanism with which to achieve compactness and component accessibility. In industrial and electronic equipment these slides are used to withdraw the chassis, usually crowded with components, to a location where the technician can efficiently work on it.

The industrial slides made by **Grant Pulley & Hardware Corp.** are fabricated from aluminum or steel shapes with precision broached ball races and stainless steel balls. These shapes fall into several groups based on size and their general load-carrying ability. In each group there is a variety of shapes which can be combined to form a telescoping action sliding device.

These slides are currently being used in missiles, business machines, test equipment, vending machines, medical equipment and so forth. (254)

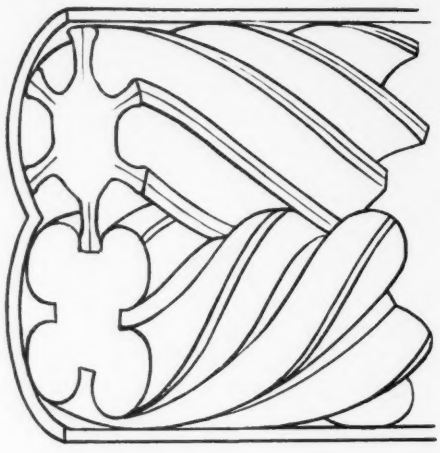


Rotary compressor: guaranteed oil-free air or gas

The positive displacement axial-flow rotary compressors made by **Fairbanks-Morse** make an interesting claim, namely to combine the best features of both reciprocating and centrifugal compressors. Performance characteristics are similar to those of the reciprocating compressor whereas (like the centrifugal type) the Fairbanks-Morse compressor will deliver oil-free air or gas.

The device is a two-impeller helical-lobe type axial-flow rotary compressor with positive displacement characteristics. The power impeller has four lobes; the secondary impeller has six matching gaps. Outside diameters are identical, but the rotating speed of the female impeller is 2/3 that of the male. Since there is no metal-to-metal contact within the compression chamber, no lubrication of the impellers is needed. There can be no lubricant contamination of the gas. Absolutely oilfree air, gas or vapor delivery is guaranteed.

In the smaller sizes, impellers are forged steel; in the larger sizes, castings. (255)

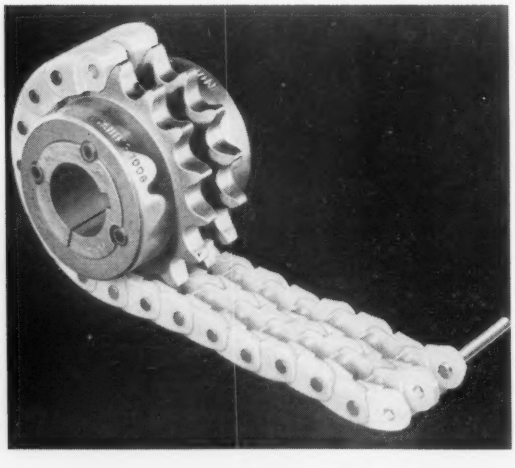


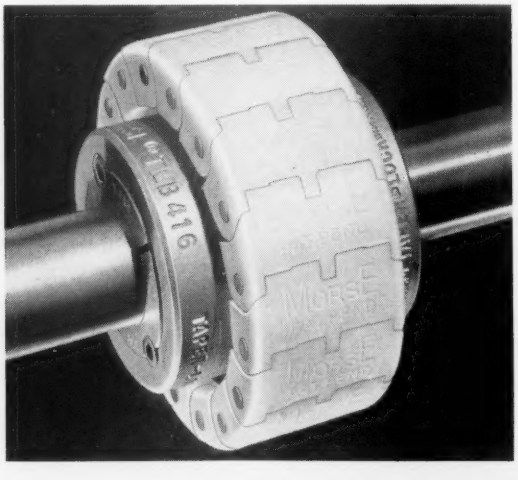
Coupling: nylon segments and stainless steel pins

Using a chain element constructed of nylon segments and stainless steel pins, the **Morse Chain Co.** is manufacturing a lubrication-free coupling.

The coupling can be taken down or re-assembled at any link (without the need for special tools) and will fit standard, stock steel roller chain sprockets. The hardened steel sprockets required by conventional steel chain couplings are quite unnecessary.

The new coupling needs no protective cover and can handle loads from fractional to 40 hp at speeds from 500 to 5,000 rpm. Specification of these couplings may give a 20% saving over all-steel couplings. (256)





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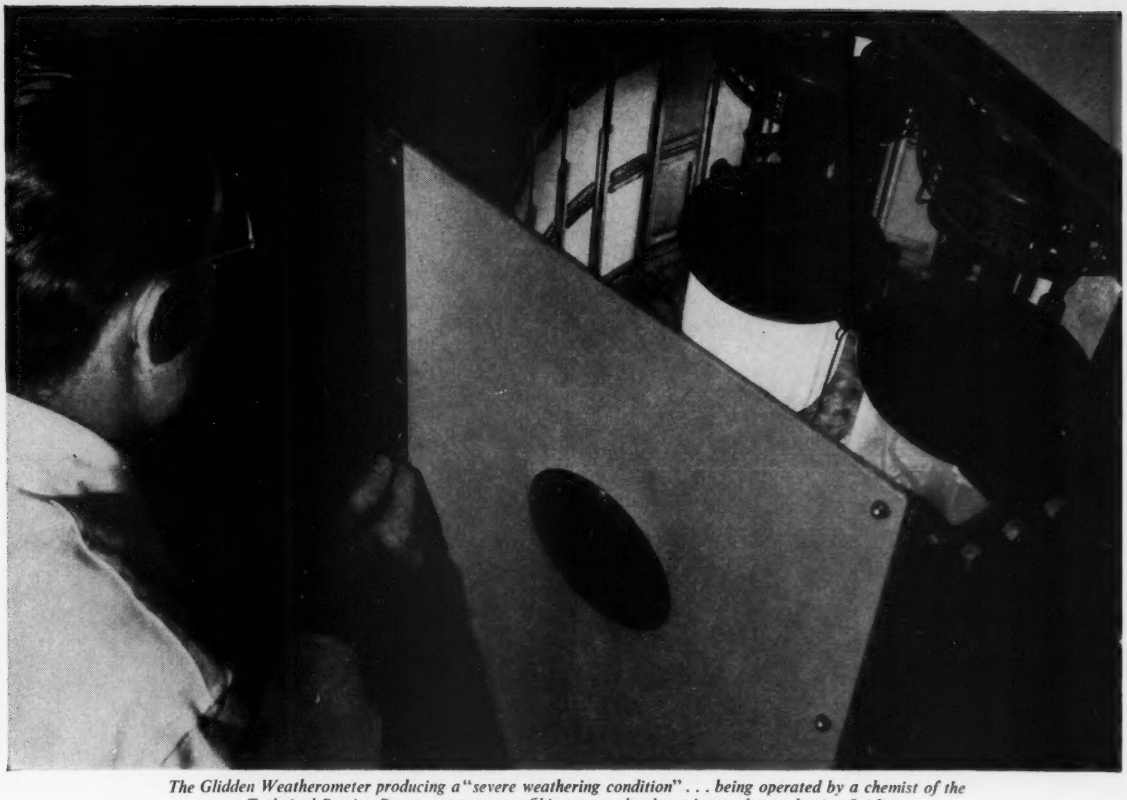


The Glidden Weatherometer producing a "severe weathering condition" . . . being operated by a chemist of the Technical Service Department as one of his tests to develop a better, longer-lasting finish.

GLIDDEN CREATES THE WORLD'S WORST WEATHER . . . TO GIVE YOU LONGER-LASTING FINISHES

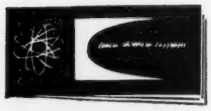
QUALITY Glidden PRODUCTS

To produce finishes that we can definitely say will last longer, stay brighter and resist weathering, we put them through many and varied tests—tests far beyond their normal requirements.

A typical example of this type of testing is carried out in the Weatherometer. This is a machine that simulates heavier rains, stronger suns and more intensive heat than any finish would normally encounter. A machine that telescopes into days the effects of years of abusive service. This is just one of the many tests carried out in the Glidden Laboratory.

We agree with you when you say testing shouldn't end in a lab. On your production line or in actual field use, Glidden continues its proving programme. Whether your problem is the effects of dust, salt spray, chemical fumes, oil vapor, extreme changes in temperature or the abuse the public gives your products—Glidden research ensures you of complete satisfaction. We will work with you to develop a finish and then prove its economy on your production line and its effectiveness in actual use.

In the Glidden Technical Service Department, consisting of practical chemists and technologists, using the most modern equipment, we are prepared to apply their wide experience to your needs. This department and the service it offers is freely available to you. Please contact your Service Representative or write us direct.



INFORMATION YOU'LL VALUE!
This booklet outlines all Glidden Technical and Laboratory Services—and how you can profit by them. We will gladly send you a free copy—just write to:

I-58-1

THE GLIDDEN COMPANY LIMITED

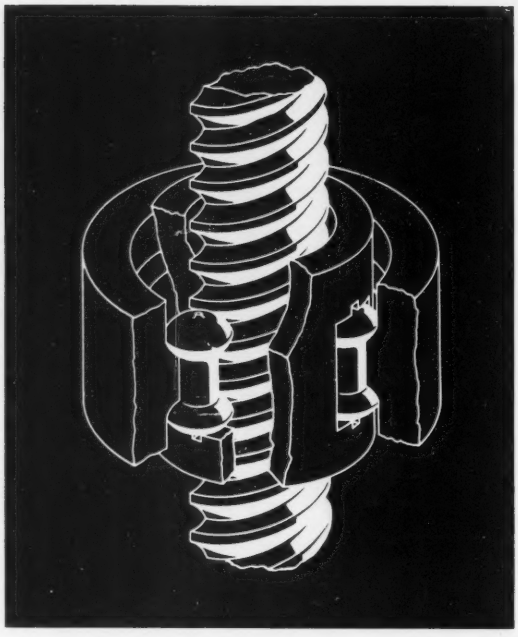
Technical Service Department • 351 Wallace Ave., Toronto, Ont. • 133 Elmslie St., Ville La Salle, Montreal, P.Q.

Bearing: dumbbell replaces the conventional ball

A clever anti-friction bearing (Roton) has been developed by the **Anderson Co.** for the efficient conversion of rotary to linear movement—and vice versa.

A worthwhile variation on an old theme, the assembly makes use of dumbbell-shaped units which are caged and roll within an annularly grooved nut functioning as the outer race with the helical thread lead of the screw acting as the inner race.

The planetary action of the caged units results in mechanical reduction of linear advancement relative to the thread lead. The units can therefore supplement speed reducers and gear boxes (or could eliminate them when the ratio permits). Another advantage of the assembly is its ability to provide for freewheeling at a predetermined end of travel pending reversal of motion. (257)

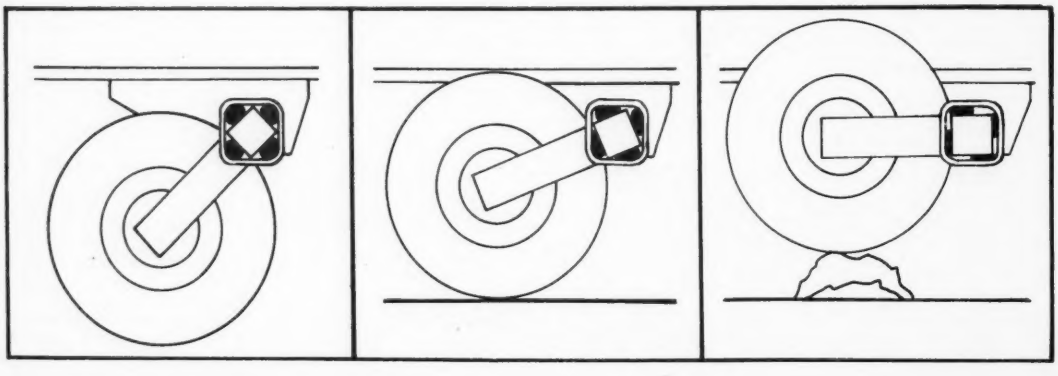


Torsion spring: rubber cords eliminate some metal

Manufactured by the **General Tire & Rubber Co.,** under Swiss patents, the Neidhart torsional spring has been used extensively in Europe, principally for trailer, bus, streetcar, mobile home and military equipment suspension systems. Its first widespread application in North America has been in boat trailers.

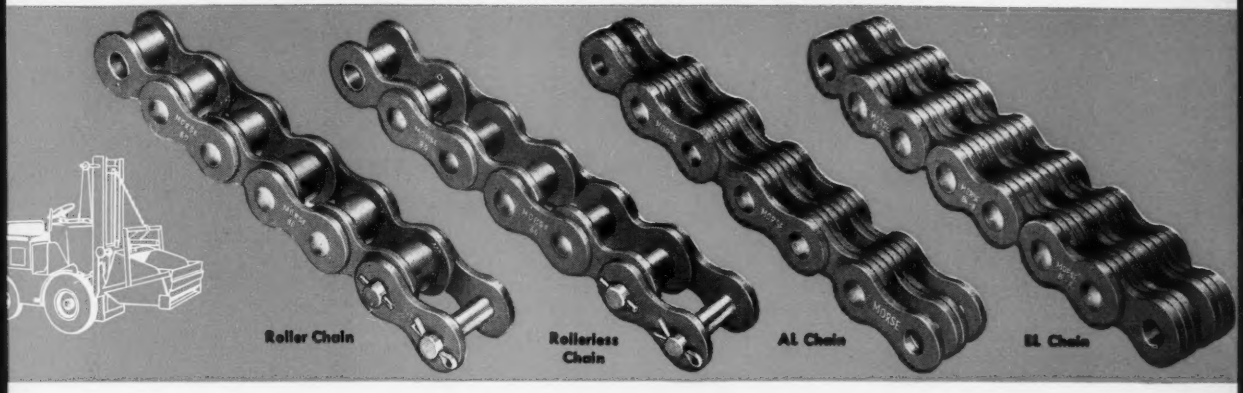
The action of the damping device should be quite plain from the three accompanying diagrams. Since there is no metallic connection between wheels and underframes, spring action is quiet at all times and each wheel acts completely independently of the opposite wheel, preventing sway and affording a smoother ride.

The spring rate increases with increasing loads. Generally speaking, there is sufficient damping due to hysteresis of the elastomer cords to make the addition of shock absorbers to the system unnecessary. (258)

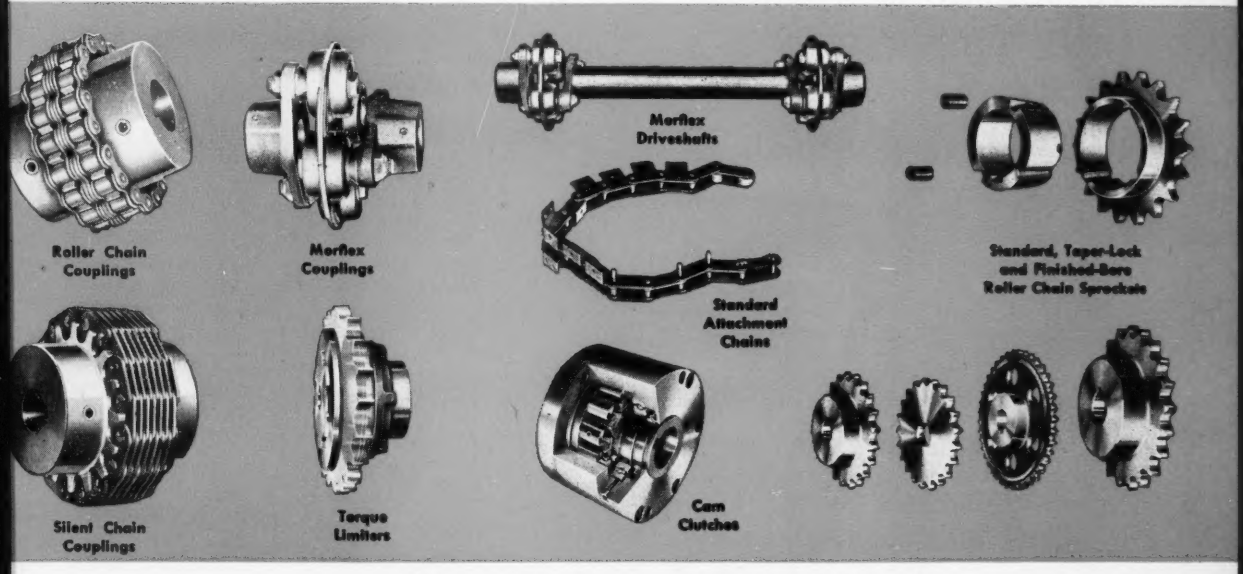


Continued on page 70

MORSE has the product . . . and the experience . . to solve your power transmission problem



Chain precision-built to A.S.A. specifications. Roller chain and rollerless chain in spiral pin, cottered, and riveted constructions. General-duty (AL type) lift chains. Heavy-duty (BL type) lift chains that feature long service life and proven dependability.



Morse Sprockets, Couplings and special products for many power transmission applications. Precision-made from the finest materials for reliability, maximum performance. Products shown are available in sizes to meet virtually any requirement.

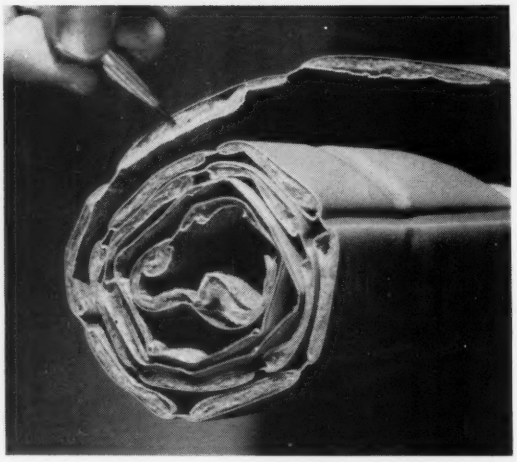
Morse Chain of Canada have further broadened their wide range of Power Transmission products by adding the assembly of the Morse Eberhardt-Denver Speed Reducers to their operations at Simcoe, Ontario. Designed in a wide range of models, each with a "performance-proven" record, these reducers are available from stock at the Simcoe, Ontario plant. Nobody can service your power transmission needs as completely as MORSE. Call your nearest Morse Distributor today; his name is listed in the Yellow Pages of your phone book; or write; *Morse Chain of Canada, Ltd., Simcoe, Ontario.*

IN POWER TRANSMISSION
THE TOUGH JOBS COME TO

MORSE

*Trademark

Reinforcements: fibre improves plastics

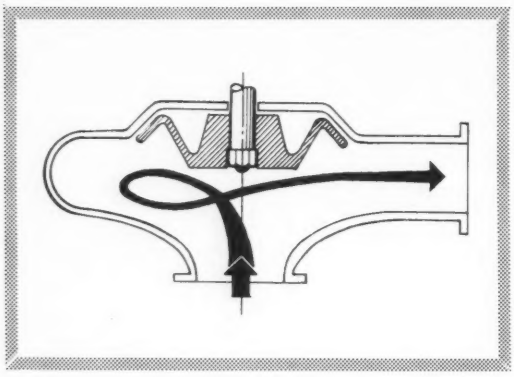


Some interesting advantages which these synthetic fibre reinforcements (by **Felters Co.**) give to plastic products include improved weathering qualities, better electrical insulating properties, high abrasion and chemical resistance and lower weight.

The thermoplastic binder used permits maximum draw and elongation without tearing in performing operations for deep draw applications.

An important application for this reinforcement is as overlay for glass fibre laminates. It brings about very substantial improvements in surface quality of such things as boats, furniture, truck bodies, aircraft parts and even swimming pools. (259)

Pump: it pumps solids without clogging

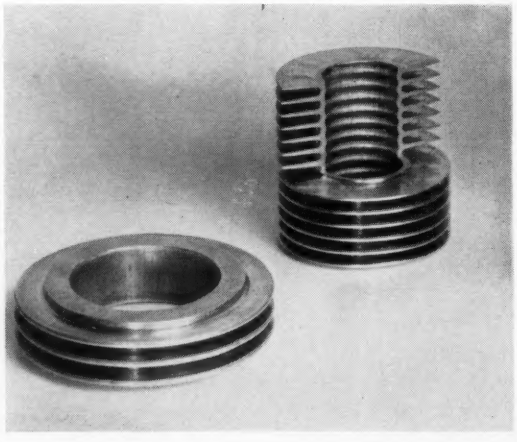


This pump from **United Steel Corp.** operates on a principle somewhat like that of an automobile torque-conversion transmission and pumps solid without plugging.

The material to be moved travels through the completely open pump case and, according to the manufacturers, even such items as live goldfish, grapes and cherries are not damaged.

The recessed impeller, though out of the flow pattern, induces a vortex that does the pumping. The rotating fluid mass forms a buffer between impeller and solid particles in flow so that few of them even touch the impeller. Hence there is no damage by bruising. Because the impeller is out of the main flow any liquid-solid combination that can enter the piping will pass through the pump. (260)

Tubing: integrally finned



Gas-cooled reactors are receiving new attention in the United States atomic power plant program as a result of British experience with them.

A major reason for the success of the British gas-cooled reactors is the use of integrally finned tubing in the heat exchangers. Heated air from the atomic furnaces produces steam for the turbogenerators by heating water circulating through finned tubes. The finning process exposes as much as one thousand percent more tube surface than straight tubing.

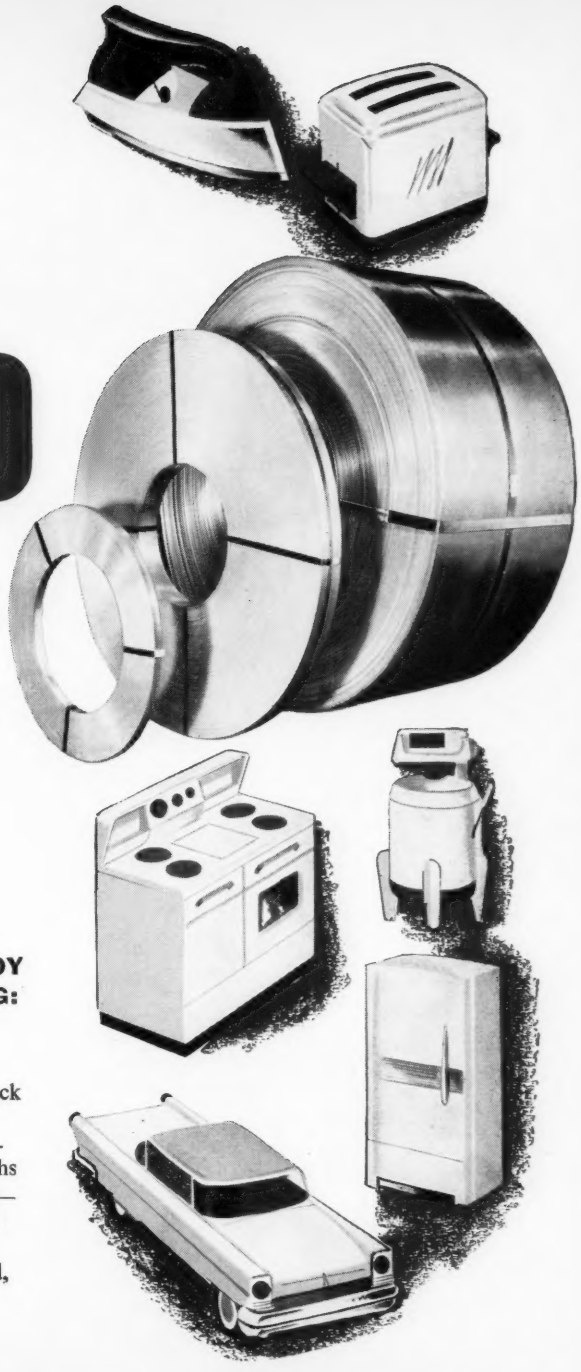
Integrally finned tubing is produced in Great Britain under license from **Calumet & Hecla Corp.**, and the company claims that the process is far more efficient and long lasting than conventional methods in which the fins are brazed or welded to the tube surface. (261)

Continued on page 72

For an iron or an automobile—
for an oil line pipe or a ship

FLAT ROLLED STEEL

must be of suitable specification
properly processed for each
individual manufacturing requirement.



ALGOMA STEEL CORPORATION PRODUCES HIGH QUALITY FLAT ROLLED STEEL IN CARBON AND ALLOY GRADES, INCLUDING THE FOLLOWING:

- Hot Rolled Universal Mill Plate
- Hot Rolled Pipe Skelp—mill or bevel edge—black or pickled and oiled—in coils or cut lengths
- Hot Rolled Sheets and Strip—mill or slit edge—black or pickled and oiled—in coils or cut lengths
- Cold Rolled Sheets and Strip—mill or slit edge—dull or bright (lustre) finish—Nos. 1,2,3,4 and 5 Temper—in coils or cut lengths
- Cold Rolled Electrical Sheets and Strip, in Field, Armature, Electrical and Motor grades

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CORPORATION, LIMITED

Sault Ste. Marie, Ontario

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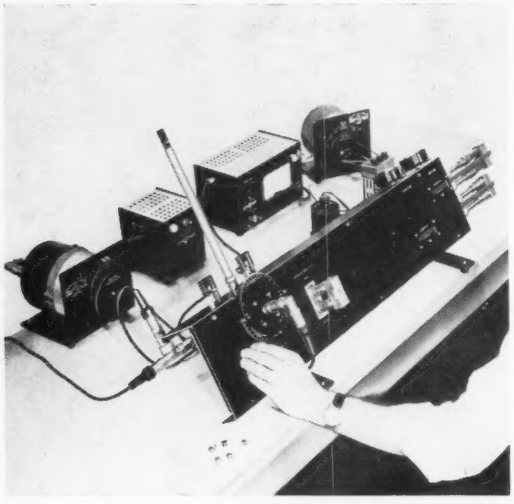
Transfer function meter: basic measuring tool



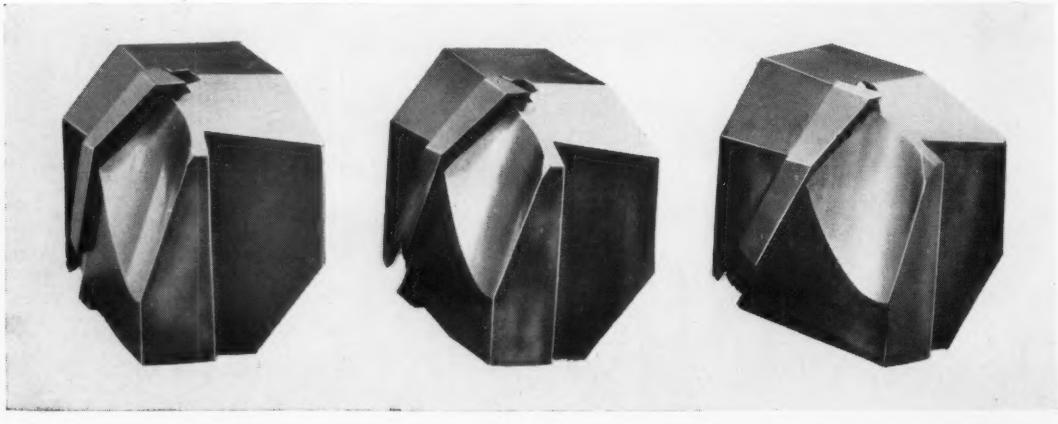
The performance of most electrical devices and circuits can be described by specifying a transfer function (which is the ratio of an output to an input quantity or vice versa). The type 1607-A transfer function meter made by **General Radio Co.** can measure many transfer functions over the frequency range from 25 to about 1,500 megacycles. Since grounded or ungrounded two-terminal impedances can be treated as four-terminal devices, they can be measured as well, with appropriate adapters. Answers (direct-reading except for a multiplying factor) are obtained in terms of complex components by a null method. The phase information provided by measurement of complex components is especially valuable at high frequencies where effects of transit time, electrode resonances and stray capacitances usually dominate the over-all performance of a device.

A basic measuring tool, well suited to laboratory measurements, it can also be set up for rapid production tests on transistors, vacuum tubes, amplifiers or networks, and does not call for a high degree of skill on the part of the operator. (262)

Insert blade cutters: a big reduction in the set-up time

Designed for a large aluminum plant, these inserted blade cutters by the **Wesson Co.** have cut the former blade-grinding time of three weeks to only a few hours. Because the blades are preset, set-up time has been reduced to 45 min. as contrasted with former set-up times of 12 to 15 hours.

The blade magazines incorporate an intricate combination of machined compound angular surfaces that impart the required clearance angles and, to a degree, axial and radial rake angles on the blade when inserted into the cutter body. When inserted into the cutter, the magazine automatically presets all cutting edges without any need for gauging or indicating for runout, common to large-diameter cutters. (263)



Contiued on page 74

Cornwall Station under construction. Entire area in the background will be flooded. (Courtesy Hydro Electric Power Commission of Ontario)

NORANDA BUS BAR

meets unique bending requirements for seaway power station

The Cornwall Station will be the largest hydro power station on the St. Lawrence Seaway Project. Its powerful generators will soon supply electric power to a wide area surrounding Cornwall and Long Sault.

Carrying power from the station's transformers to switchboards and from the switchboards to panel boards will be large 21-bar, 4000 amp. ventilated Taylor Type "L.D." Busways, manufactured by Taylor Electric Manufacturing Co. Ltd., London, Ontario.

A feature of these modern busways is bus bars made of Noranda Electrolytic Copper. Five essential requirements had to be met by the Noranda bus bar before final acceptance—

1. Special temper—soft enough to take bending operation, yet rigid enough to support its own weight.

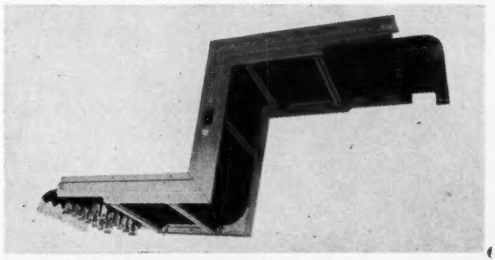
2. Ability to bend edgewise without cracking.

3. Corrosion resistance required in all electrical applications.

4. High, unimpaired conductivity.

5. Full round edge.

The readiness with which Noranda bus bar met all five requirements is indicative of the quality and versatility of all Noranda copper and copper alloy products. It is basic in Noranda's ability to meet the wide and ever-growing needs of Canadian industry for rod, tube or strip. Call your nearest Noranda Sales Office for prompt and satisfactory service.



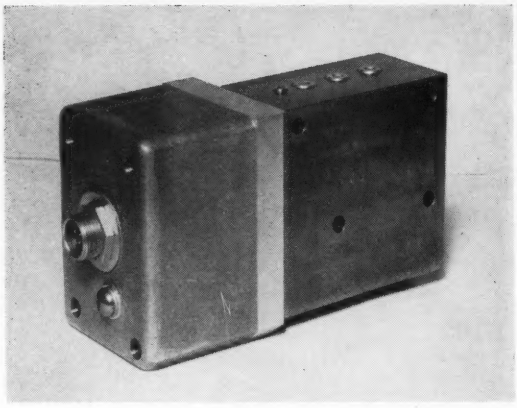
Taylor Type "L.D." Busway. Maintenance of proper tempers allow edgewise bends to be made in bus bar on standard equipment without local annealing.

Noranda Copper and Brass Limited

Sales Offices: Montreal • Toronto • London • Edmonton • Vancouver

Servo valve:

it has only four moving parts



At the heart of a servomechanism system is the servo valve. **Vickers-Sperry's** is specially designed for rugged industrial use and can be tailored to almost any industrial servo application.

The valve has only four moving parts—main spool, control spool, sleeve and feedback linkage. It can be direct gasket or sub-plate mounted or manifolded to a hydraulic motor.

A mechanical feedback linkage with a variable fulcrum provides high flexibility to the various conditions of flow, response and pressure. (264)

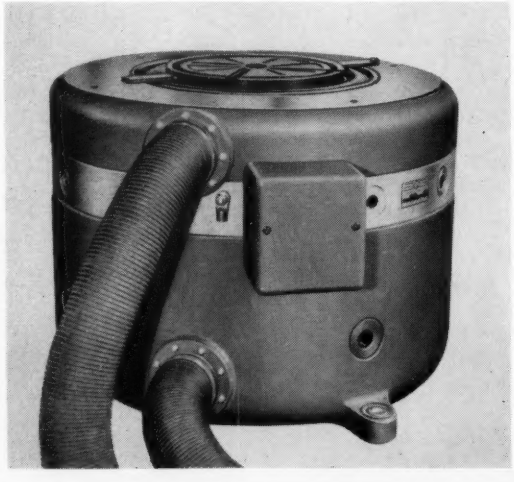
Ball bearing: long life from a full ball complement

The problem of increasing a ball bearing's load capacity and extending bearing life by adding more balls without limiting performance has been solved by **Split Ballbearing's** opened ring technique.

The construction method permits using a full ball complement for high radial load capacity and long life, without reduction of thrust load capacity since no loading slot is used. In addition, this method allows the use of a one-piece retainer contributing to lower torque characteristics and higher operating speed.

There are other design advantages. The outer ring forms integral shields on both sides of the ball bearing. The small annulus between the shield and inner ring allows it to function virtually as a labyrinth seal and torque and ring distortion, often caused by inserted seals, are absent in the design. (265)

Vibration generator



The Goodmans vibration generator from **Nickam Instruments & Supply Ltd.,** has been designed for testing large loads at high acceleration, mainly to accommodate expanding demands of modern research on high speed aircraft and guided missiles. On a load of half-a-ton, it will give an acceleration of nearly 8 g, or on a load of 1 cwt. an acceleration of nearly 40 g.

Such equipment consumes considerable power and consequently requires efficient cooling of the working element. Standard cooling equipment is a centrifugal fan driven by: a 20 hp 3-phase motor and controlled by star-delta starting equipment capable of full interlocking with the rest of the vibration system.

The blower can be installed some distance from the vibration generator, the draft being ducted to and from the vibrator by 6-in. diam. flexible hose. (266)

Continued on page 76

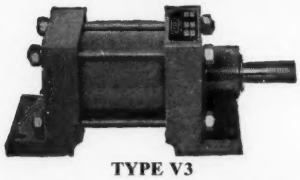
VICEROY

Hydraulic Presses
Air and Hydraulic Cylinders **Air and Hydraulic Hoists** **Vulcanizers**
Oildraulic Pump Units

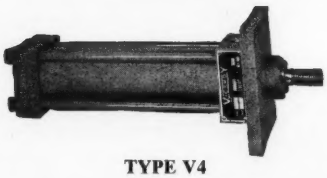
MADE IN CANADA

TYPE V1

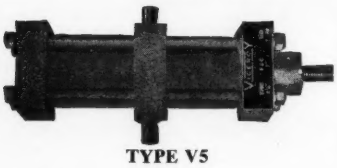
TYPE V2



TYPE V3



TYPE V4



TYPE V5

STANDARD CYLINDERS — For working pressures of 150 p.s.i. Air or 500 p.s.i. Water or Oil. Accurately machined interchangeable components — steel caps — dural pistons — brass tubing — stainless steel piston rods — superior quality chevron and cup packings suitable for operating conditions as required. Single or double acting — cushioned or non-cushioned. Precision built for long, trouble-free operation.

DIRECT ACTING HOISTS — For working pressures of 150 p.s.i. air or 300 p.s.i. water or oil. Standard size range 2″ diameter to 10″ diameter. All practical stroke lengths.

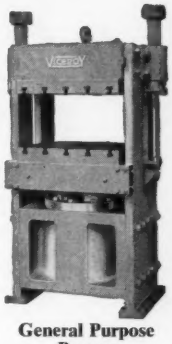
HEAVY DUTY CYLINDERS — For working pressures up to 3000 p.s.i. Oil or Water. Engineered precision design. All types of mountings to suit any application.

HYDRAULIC PRESSES — Standardized Viceroy Line and Special Design Types. Steel slab side or strain rod construction. Capacities from 35 to 400 tons. Unheated types for all forming, drawing, straightening or assembling operations and steam or electrically heated types for various moulding, vulcanizing, laminating and other applications requiring hot or cold treatment or combined heating and cooling under pressure.

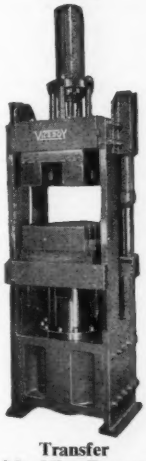
OILDRAULIC PUMP UNITS — Hand operated — motorized or line shaft driven in any capacity for the efficient operation of cylinders — elevators — and hydraulic presses. Compact, self-contained power packages.

SPECIAL MACHINERY — Built to customers' drawings in one of Canada's most modern machine shops.

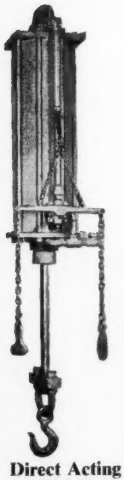
Literature and Additional Data Available upon Request
Your Inquiries will be Appreciated



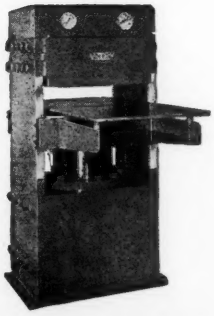
General Purpose Presses



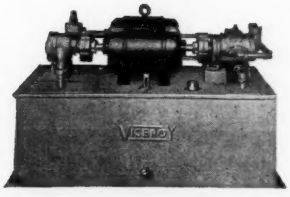
Transfer Moulding Presses



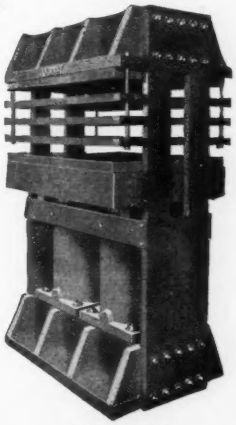
Direct Acting Hoists



Compression Moulding Presses



Oildraulic Pump Units



Multi Deck Presses

VICEROY MANUFACTURING CO. LIMITED

ENGINEERING DIVISION

1655 DUPONT STREET WEST TORONTO, CANADA

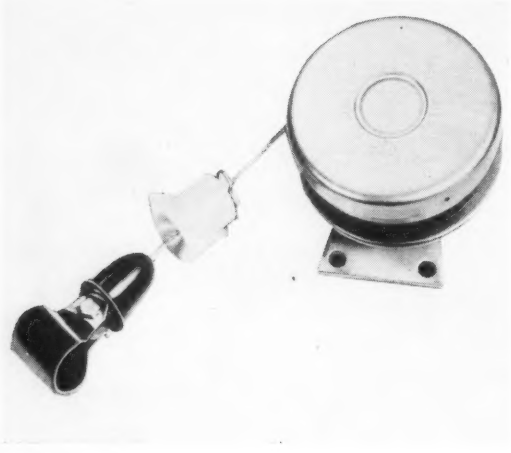
Solenoid valve: all-plastic

Valcor's all plastic solenoid valve has no metal contact with the fluid—ever. Specifically designed to handle most of the corrosive fluids used in industry, the manufacturer claims that, in many cases, the valve will outlast stainless steel valves 100 to 1.

The moulded nylon body has a plastic diaphragm seal with positive bubble-type sealing and the valve may be taken apart for cleaning and inspection without removing it from its line.

The valve comes equipped with 24-in. pigtail leads and has a maximum operating pressure of 7 psi. The glass-impregnated, continuous-duty coil eliminates electrical failures due to moisture. (267)

Hose retriever: safe support at the filling station



The Hunter Spring Co., has a new reel specially designed for safe one-man filling station service. Its prime feature is the fact that it does'nt depend on securing an automatic nozzle to the car being serviced. It permits the hose to rest in the extended position while the nozzle is inserted in the gasoline tank filler.

The device can be adapted for use in any type of pump and embodies an internal latch that automatically sets every 3 in. of hose extension. It is simply released by a short tug.

Retrieving power comes from a spring which exhibits very little force build-up as the hose is extended. It is easy to pull the hose out to full length and, when retrieved against the pump, the hose is supported above the pavement and safely out of the way.

The complete assembly includes cable reel, 10½ ft. of nylon-coated steel cable and the necessary hardware for attaching the cable to ¾-in. hose. The unit weighs 3½ lbs. (268)

Motor kit: simple to assemble

Determining proper servo, torque and synchronous motor requirements for instrumentation and automation applications can be a time-consuming and expensive proposition.

Holtzer-Cabot is marketing a systems development motor kit which should make the job a whole lot easier. This kit contains all the necessary motors, motor components and gear reduction units to assemble 32 different servo, torque or synchronous motors, with or without integral gear reduction units.

An instruction manual comes with the kit and this contains complete motor performance data and speed-torque curves as well as simple instructions for motor and gear reduction unit assemblies. Bench tools are all that are required to make up any of the motors. (269)

Continued on page 78

Book Department

Stainless steel fabrication. The purpose of this beautifully produced 386-page handbook is to aid and guide not only those already engaged in the manufacture of stainless steel products, but also those who are planning to initiate such production. Well - illustrated and explained with photographs, charts and graphs, the book's chapters cover all common methods and practices required for successful fabrication as well as the precautions and treatment necessary to ensure the realization of the inherent properties of the stainless steel in the finished part.

Want a copy? One can be had by writing on your company letterhead to the Allegheny Ludlum Steel Corp.

Ideas, inventions and patents. This book is intended primarily for engineers and scientists engaged in research and development activities, and for those businessmen engaged in planning and managing industrial enterprises in which inventions, patents and trademarks play a role. The intention of author Robert A. Buckles has been to present in broad general outline the fundamental principles and philosophy of the laws respecting "intellectual property," for the purpose of pointing the way to more effective protection and exploitation of ideas and inventions.

Mr. Buckles takes his reader step by step through the complete case history of a simple invention, providing an excellent guide for readers who have had no previous experience with the Patent Office or with patent attornies.

The book is available from John Wiley & Sons, Inc. The price is $5.95.

Electronic data processing for business and industry. Author Richard G. Canning, who is a partner in Canning, Sisson & Associates, as well as associate research engineer at the University of California, has set out in this book to answer three questions most asked by today's top management executives: What is electronic data processing? What can it do for my company? How should I go about investigating it?

Canning employs the terms of management in answering these queries. Little or no previous knowledge of the electronics field is needed to understand the book. The several major "patterns" of electronic data processing systems are clearly described, and are illustrated by references to actual case studies.

Mr. Canning has since written a follow-up to this volume (see below).

The book is available from John Wiley & Sons, Inc. The price is $7.

is this the missing component in your instrumentation problem?

AVIATION ELECTRIC'S NEW BALL RESOLVER

A new miniature calculator that has many applications in the general field of engineering design is currently being manufactured by Aviation Electric Limited of Montreal. The unit illustrated is being used with great success in Canada for the automatic calculation of sine, cosine and tangents in advanced navigational systems. Compact and light in weight, this resolver offers great accuracy of performance under the most rigorous conditions.

Based on a 19th century invention, the principle behind the new resolver is remarkable in its simplicity. Aviation Electric engineers, however, had to overcome many difficulties of design to develop a miniaturized instrument capable of instantaneous and continuous calculations to an accuracy greater than 0.3%, under conditions of great stress, with a temperature variation from +160°F. to −65°F.

Miniature resolvers are destined to play an important part in guided missile control and future technological advances of many kinds. Aviation Electric will be glad to discuss the application of this new ball resolver to your instrumentation problems and, if necessary, to design an entirely new unit for your purposes.

For further details and illustrated literature write to:

AVIATION ELECTRIC
LIMITED

200 Laurentien Blvd., Montreal, P.Q.
Branch Plant:
Aviation Electric Pacific Limited, Vancouver Airport, Vancouver, B.C.

Bearing: powder metallurgy used

The Heim Co., now produce their 2-piece Unibal spherical bearing by a powder metallurgy technique. Controlled thermal, physical-chemical and mechanical steps produce the balls which are of high-density, through-hardened powdered iron alloy. The outer members of the unit are made of sintered iron or sintered bronze with controlled porosity.

Heim's pressing and sintering procedures make it possible for them to produce a bearing which will hold up to 20% of its own volume in oil. This, of course, means longer bearing life with a minimum of relubrication. The company has made tests on a 5/16-in. bore bearing at 1,350 rpm with a 30-lb load. The bearing ran for 2,000 hrs with only weekly relubrication. (270)

Shaded pole motor: the parts are press fitted

These shaded pole motors from **Robbins & Myers** are available from 1/500th to 1/75th hp.

They find their applications in such equipment as refrigeration, air conditioning, tape recorders, vending machines and so forth. Designed for either horizontal or vertical application, their heavy construction eliminates vibration and makes them quiet-running.

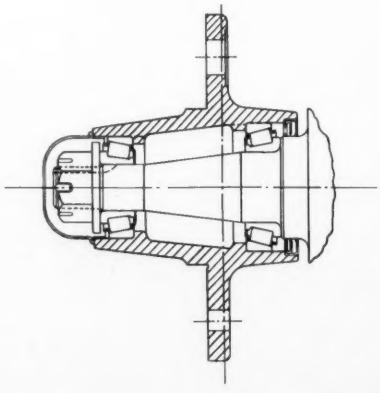
The motors have extra large oil reservoirs with a continuous circulation of filtered oil to the bearing and come equipped with a removable plug to replenish oil supply after lengthy service.

Perfect alignment is obtained by a press fit of the motor parts. No body bolts are required. (271)

Wheel bearing: suitable for the small auto

When they designed this wheel bearing, the **Timken Roller Bearing Co.,** had in mind the small type of car that may eventually be built in the U. S. and Canada. It would also seem to have applications in farm machinery, boat trailers, small size belt conveyors and some other industrial applications.

Chief boast of these bearings is low cost and high capacity for their size. They should also provide some savings in hub materials, seals, nuts and dust caps. The size range is 11/16 in. and 1 1/16 in. bore. (272)

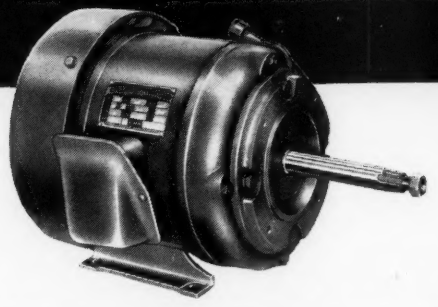


Continued on page 81

Precision operation without costly aligning problems!

R&M

close coupled pump motors to YOUR SPECIFICATIONS



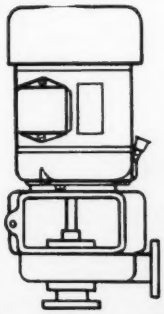
This R&M pump motor is ideally suited to centrifugal pumps with either open or closed face impellers. The impeller is mounted directly onto our motor shaft, thus eliminating the more costly method of using flexible couplings and heavy base plates. You get longer life and better performance from your pumps with these drip-proof or totally enclosed fan-cooled R&M motors.

TAKE ADVANTAGE OF THESE FEATURES

These motors are available in ratings from ¼ to 50 horsepower; CEMA rerate motors to frame 365U equipped with CEMA rerate standard flanges; heavy duty motor bearings with extra thrust capacity; locked bearing construction to eliminate end play; accurate CEMA machine tolerances on flange and shaft. The single motor pump shaft assures perfect alignment of all rotating parts.

A WIDE RANGE OF SHAFT FEATURES AVAILABLE

- Special length
- Oversize diameter
- Special machining to suit pump seal
- Complete with thread and/or taper
- Available in stainless steel for food pump as an extra



HORIZONTAL OR VERTICAL

These R&M motors may be used on centrifugal pumps either vertically or horizontally or in any angular position. Where the pump is mounted vertically, it is advisable that the motor be placed above the pump.

In addition to the above features, you get ***guaranteed*** motor performance. Moreover, the R&M motor is attractively priced. It is a Canadian motor built by Canadian workers. For further information, ask for Bulletin 2003/C3A.

THE ROBBINS & MYERS COMPANY
of CANADA LIMITED—BRANTFORD, ONTARIO

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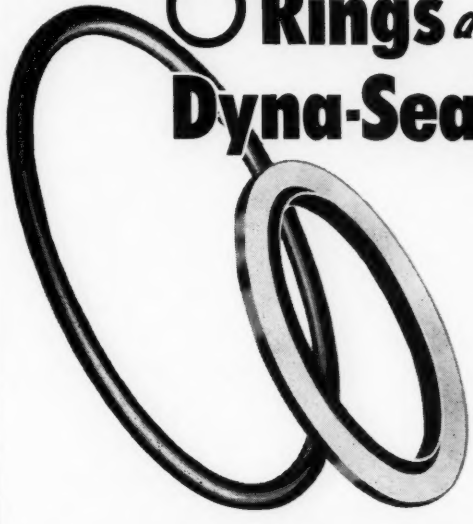
is the word for

"O" Rings *and* Dyna-Seals



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FOR high pressure or low pressure sealing — Precision "O" Rings and Dyna-seals are quality controlled—compression molded—rigidly inspected—the finest made!

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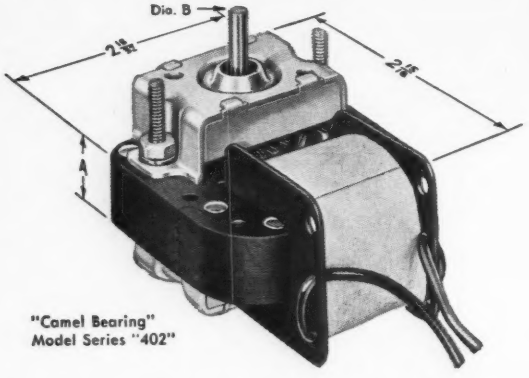
SORENG shaded pole motors with CAMEL BEARING* design give extra long life service



"Camel Bearing"
Model Series "402"

The "402" Shaded-Pole Motor is built to last. It's a rugged little powerhouse with an extra long life due to its exclusive, Camel Bearing design. This special bearing bracket provides automatic, positive oil circulation even under high temperatures. Oil is constantly feeding into bearing cavities as operating conditions demand. Standard mounting holes make it interchangeable with other motors. Range of 12 models covers all types of applications including spring-wire, gear, chain, rubber belt and friction drives or, to move high velocity, heater or sirocco air. Write for free booklet.

Series "401" for standard life applications — Here's a tough, durable model shaded pole motor that has bearings with self-aligning features and an open-skeleton frame for effective heat dissipation. Choice of 12 models.

DRAWINGS NO'S	402-10 402-11 401-10 401-11	402-20 402-21 401-20 401-21	402-30 402-31 401-30 401-31	402-40 402-41 401-40 401-41	402-50 402-51 401-50 401-51	402-60 402-61 401-60 401-61
VOLTS	115	115	115	115	115	115
FREQUENCY	60	60	60	60	60	60
AMPERE—NO LOAD	0.31	0.42	0.55	0.64	0.97	1.31
WATTS—NO LOAD	13.5	19	24	27.7	40	53
R P M—NO LOAD	3400	3480	3500	3570	3560	3550
MAX. HP. OUTPUT(1)	1/500	1/200	1/125	1/75	1/50	1/40
START TORQUE OZ. IN	0.58	1.4	2.3	2.3	3.3	4.9
STALLED WATTS	18	29	40	45	68	98
STACK WIDTH "A"	⅜"	⅜"	¾"	⅜"	1-⅛"	1-½"
SHAFT DIA. "B"	0.182	0.182	0.182	0.182	0.2178	0.2178
WEIGHT—POUNDS	0.8	1.2	1.4	1.6	1.9	2.4

NOTES: (1) HP rating at 3000 RPM — continuous duty fan load. (2) All numbers ending in "0" denote clockwise shaft rotation. All numbers ending in "1" denote counter-clockwise shaft rotation.
*Original users of *Perma-wick*

CONTROLS COMPANY OF AMERICA (CANADA) LIMITED
SORENG Manufacturers of *SORENG* CONTROLS
COOKSVILLE, ONTARIO, CANADA

IMPERIAL *Hi-Duty*®

Tube fittings

36 to 77% savings in installation time!

Just push tube into fitting without removing nut and tighten...that's all

Tests reveal Hi-Duty fittings make tube connections in *36%* less time than regular compression fittings . . . *77%* less time than flare fittings. Unit has one-piece nut and sleeve. The sleeve shears off in assembly. You get stronger joints because sleeve is always in perfect alignment.

Takes up to 5 times more vibration than ordinary compression or flared fittings. Fittings remain leakproof, even under severe service. Exclusive design minimizes deformation of tubing.

Furnished in brass or aluminum, for ⅛ to 1" O.D. tubing.

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IMPERIAL *Hi-Duty*® Shut-off Valves

Perfect fluid control! Best protection against leakage. Positive shut-off. 2, 3 and 4-way types. Low and medium pressures.

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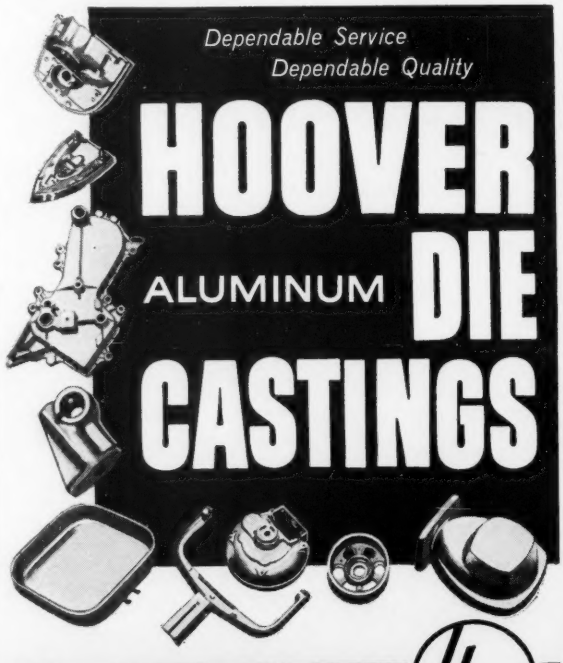


For prices, delivery, complete information, contact:

DIE CASTINGS DIVISION
THE HOOVER COMPANY LTD., HAMILTON, CANADA.

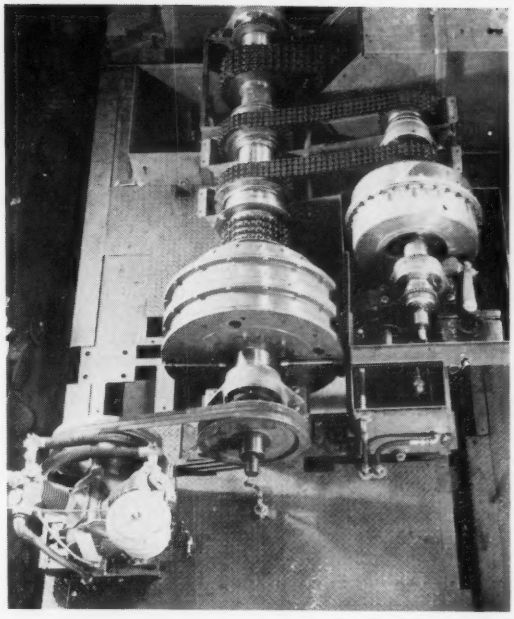
Auxiliary draw works drive: rotary speed can vary to suit drilling requirements

The National Supply Co., has an auxiliary draw works drive which permits the speed of the rotary to be varied to suit drilling requirements. This, even though all the engines in the drive group are operated as a single unit to power the slush pumps.

The drive has been field tested for more than a year in drilling operations in California.

In operating rigs with large engines, it was once necessary to separate the front engine from the others while drilling, using the front engine lightly loaded to drive the rotary (by means of the draw works) although the other engines might be severely loaded by the pumping job.

The auxiliary drive makes it possible to use all the engines for pump driving, at the same time bleeding-off just the right amount of power and speed as needed by the rotary table. This diverted power can range up to 300 hp. (273)



Pile driver discs: vulcanized fibre cuts down on damaged piles

A big problem in the driving of steel piles is the tendency of the piles to pleat up accordion-style or to split. This can be overcome by placing some sort of pad beneath the steel driving block in the base of the hammer to absorb the first shock of the ram as it drops.

Wooden discs will do the job but, in the long run, they run up the expenses as they wear out quickly and are constantly in need of changing.

The **National Vulcanized Fibre Co.,** has taken a big stride toward an ideal solution with the production of vulcanized fibre discs. 14 in. diameter by 2 in. thick and held together by 1-in. pegs, they absorb initial impact but nevertheless deliver the full force of the pile driver.

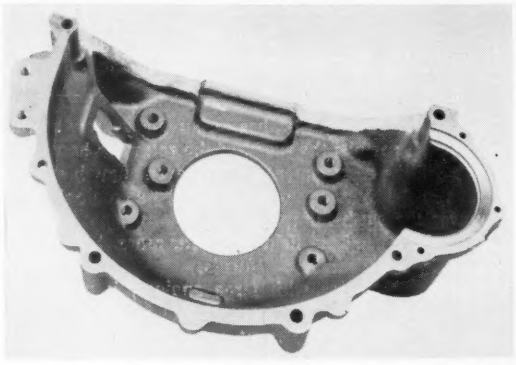
Used on the Wolcott St. Bridge spanning the Connecticut River just north of Hartford, these discs proved themselves in operation. Gordon Linberg, manager of the project, was enthusiastic and says "the number of piles bent by the hammer has taken a real cut. The operation has become simpler and cheaper at the same time. Less labor is involved." (274)

Continued overleaf

Boring machine: work on a heavy cast iron clutch housing

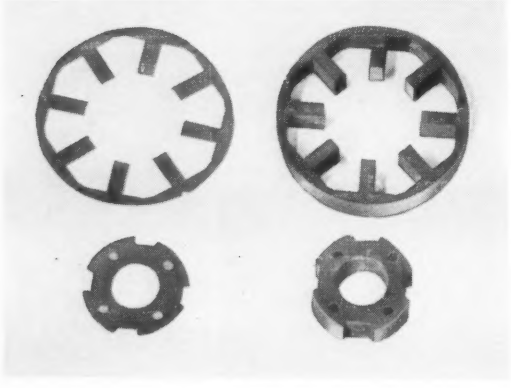
The component shown is a heavy cast-iron clutch housing for a medium truck. The operation is to face and precision bore the starter motor mounting, rough and finish operations being required in one machining cycle. The fixture, of rugged construction, utilizes cam action hand clamping and dowel pin location.

The operator of the **Ex-Cell-O Corporation** precision boring machine (Style 2112-B) clamps the part and starts the cycle. Rapid traverse brings the component in proximity to the tooling, which is mounted on a standard hydraulically-operated facing head. This facing head is tooled so that initial movement takes roughing tools into depth, roughing the shoulder faces and plunging the bores. Subsequent movement in the opposite direction carries a second set of tools into position, for finishing these surfaces. Tooling is set so that, when the table feeds out, the bore diameters are finished, leaving



no drag lines. After feed-out, the table and facing head retract to start position. (275)

Aluminum-iron alloys



Aluminum-iron alloys containing from 13% to 17% aluminum are now available and the manufacturer concerned is **Metals and Controls Corporation.**

The alloys are particularly suitable for applications requiring soft magnetic materials and quality core materials for high frequency applications. In motor cores, for example, the substitution of aluminum-iron alloy for iron-alloy laminations provided a stable material that can maintain constant magnetic properties regardless of ambient temperature or age of the material.

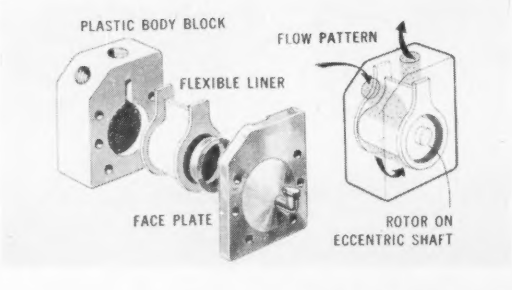
Aluminum-iron alloys have magnetic properties at least equal to 50% nickel-iron or grain-oriented silicon iron. Some of their other advantages are low density, high electrical sensitivity, low strain sensitivity, physical hardness and good corrosion and oxidation resistance. The low density of aluminum-iron alloy makes core weight reduction possible when replacing nickel-iron and silicon-iron alloys. (276)

Sealless pump: moving liquids with a squeegee action

Vanton plastic sealless pumps are self-priming and will handle liquids, slurries and gases equally well.

Shaft seals and stuffing boxes have been eliminated and the only maintenance required is the replacement of the inexpensive flexible liner inside the pump housing. Simple design allows fluid contacts with only two basic parts, both plastic or synthetic rubber—the liner and pump body block.

A rotor mounted on an eccentric shaft rotates within the liner creating a progressive squeegee action of the fluid trapped between the outside surface of the liner and the inside of the grooved body block. (277)



Continued on page 86

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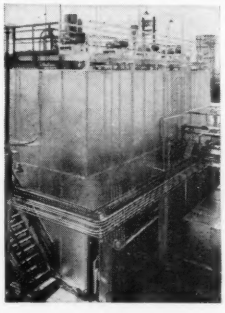

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LINDSAY STRUCTURE
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- **NO SPECIAL SKILL**
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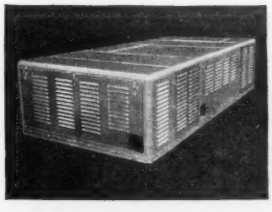

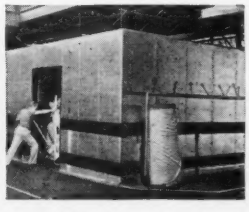

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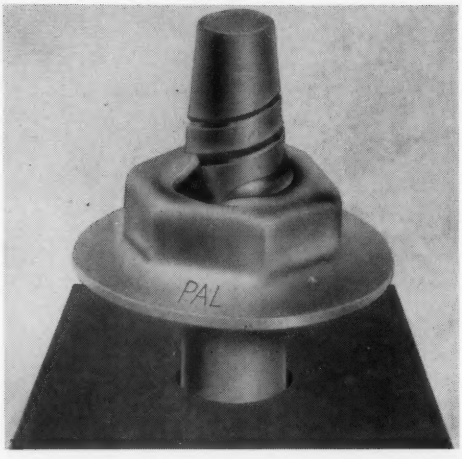


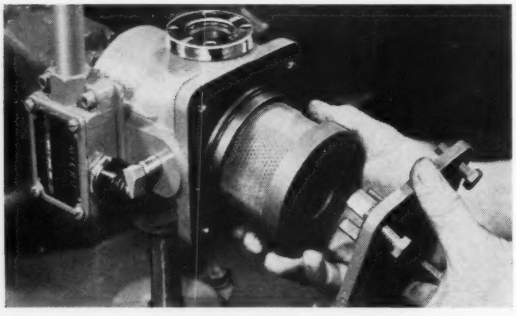
These self-threaders have approximately the same strength as conventional threaded parts.

Made by **The Palnut Co.,** special tools are unnecessary and the standard magnetic sockets on power or hand drivers can be used. There's no need for the studs to project through the panel at an exact rightangle for they can be as much as 20 deg. off vertical.

The device cannot crossthread so the assembly man can hit the stud 10 or 15 deg. out of line and complete a fully satisfactory assembly.

These fasteners are available with integral washers and the washers have nibs to make a ground by biting into the surface they are snugged up to. (278)

Fluid filter: it tells you when the unit needs cleaning

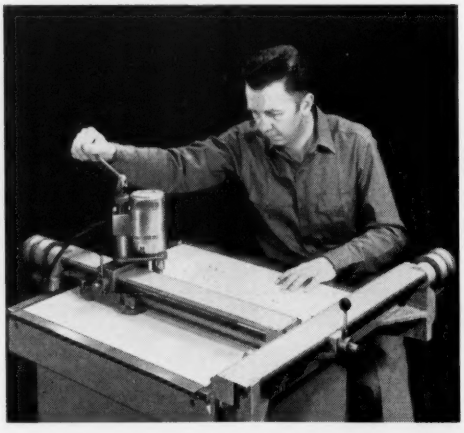


The Rosaen filter from **Stratoflex of Canada Ltd.,** is a fluid filtering unit which indicates when the filter medium requires cleaning and bypasses the fluid around the filter if the cleaning signal is ignored.

These units signal by a mechanically actuated needle that points to legends reading: "filter is clean", "need cleaning", and "bypassing." The filter cartridge may also be observed through the glass port in the housing. An optional limit switch may be provided to work the remote signals or even shut down the power to the system.

All filters are available in 5 degrees of filtration (size of the smallest particle stopped). (279)

Drilling layout machine



The **Strippit** Flex-o-Drill produces templates and layouts with speed and high accuracy. It is a table-type machine for drilling, reaming, centre punching and scribing.

It eliminates the necessity for base line drawings or the use of vernier height gauges. Two adjustable steel tapes position the bridge and drill carriage. On these tapes, the coarse part of the dimensions for hole-to-hole drilling, reaming, centre punching and scribing are set up. The fine part of the dimensions are then accomplished by the gauges on the left and righthand side of the drill which zero them in to a tolerance of plus or minus .002 in.

The gauges will make compensation for metal thickness and bend allowance. Generally, a single calculation only is required in production of templates. (280)

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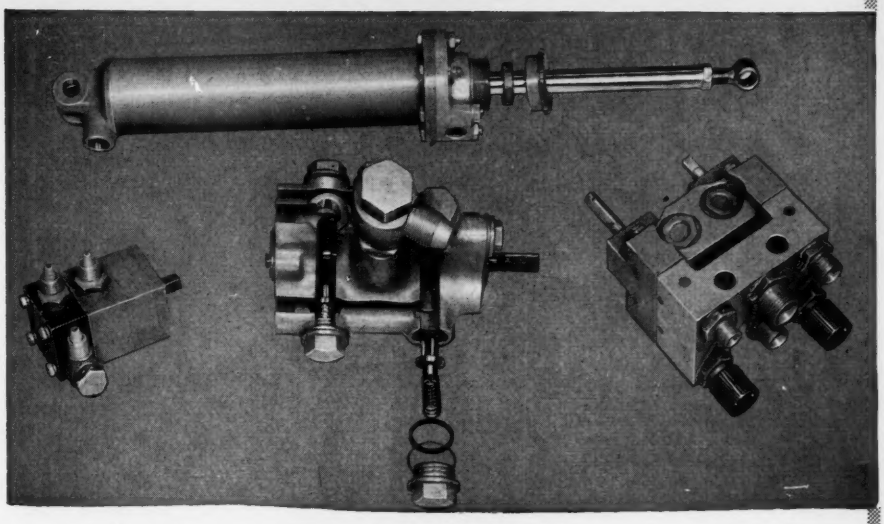

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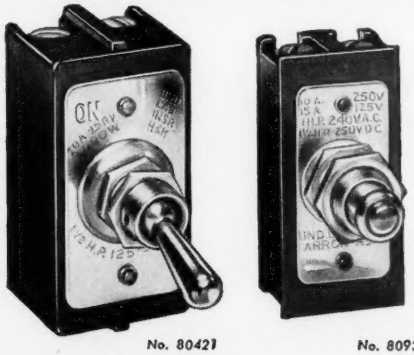

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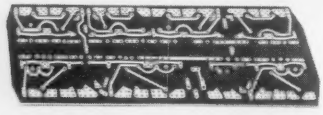
New Products

Epoxy bonded laminate

A new epoxy bonded fibre glass laminate with improved flexural strength retention at elevated temperatures has been announced by National Vulcanized Fibre Co. This new material is called Phenolite.

The material retains 70 to 80% of its original flexural strength when tested at 150 deg. C after conditioning for one



hour at that temperature. Conventional epoxy laminates of this type retain 5 to 10% when conditioned and tested at 130 deg. C. It offers all the excellent electrical properties and great mechanical strength of epoxy bonded materials plus the unusual heat resistance. (281)

Wing nuts

The first group in a newly-developed series of standard specifications covering all types of die cast zinc alloy threaded fasteners has just been issued by Gries Reproducer Corporation. The new standards come at an opportune time, since they will enable engineers and purchasing agents to cut costs by selecting from the wide range of threaded fastener types mass-produced and offered by Gries as standard units. Most of these fasteners are available only on special order, at considerably higher cost, when made by conventional techniques. (282)

Miniature bearings

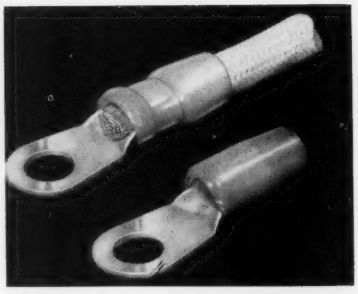
The Barden Corporation has extended its line of precision miniature ball bearings to include the full range of smaller sizes. The new sizes now being marketed introduce a number of superior performance characteristics available for the first time.

The new miniature sizes have been designed with closer inner ring curvatures, equalizing contact stresses on inner and outer ring raceways. This results in increased static and dynamic load capacity with no increase in torque. (283)

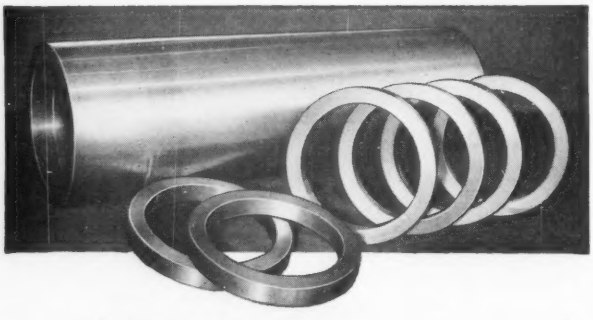
Insulated terminal

A nylon insulated terminal for large wire sizes, has been developed by AMP Inc. for applications involving high temperature and ester-based oils.

Nylon insulation was adapted to the terminals specifically for conditions where prolonged temperatures are a factor and where ester-based oils are liable to attack other type large wire terminals.



The major features are: helical design at the neck of the tongue for greater strength at minimum weight penalty; cast insulation with formed entry ramp for snug fit over standard AN wires; color coding for easy identification. (284)



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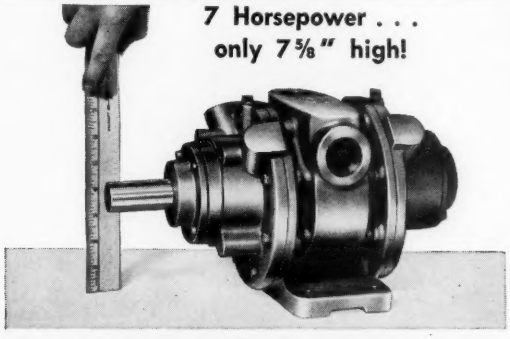

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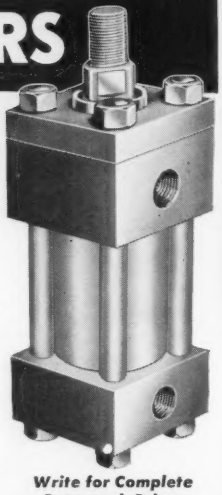

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HYDRAULIC CYLINDERS. Job-Rated Model "J" for 500-2500 psi operation, 1½" through 8" bores. Power-Packed Model "H" for 3000-5000 psi, 1½" through 5" bores.

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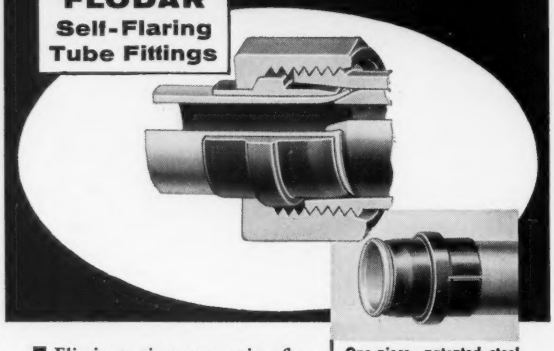

■ Eliminate time-consuming flaring, welding, brazing or soldering with unique FLODAR Self-Flaring tube fittings. Tubing costs are reduced because heavy wall tubing is not needed to assure a good joint. Tube shearing and work-hardening are eliminated and fittings may be reassembled time after time without fear of leakage and damage to fittings.

One-piece, patented steel sleeve forms pressure-tight seal on both OD and ID of tube. Slotted rear of sleeve grips the tube against vibration.

- **Eliminates flaring, threading and soldering.**
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- "O" ring packed teflon backup rings
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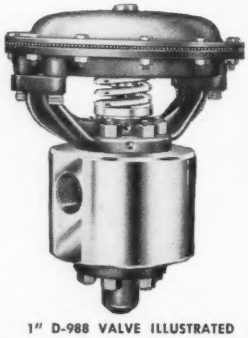
- Stellite seats
- Air pressure operated for remote control



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In designing this range of valves Sinclair-Collins has attained a new peak in ruggedness, simplicity of construction and greater standardization.

These valves have been built to give maximum service with greater ease of maintenance.

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A HARTFORD THRUST RETAINER

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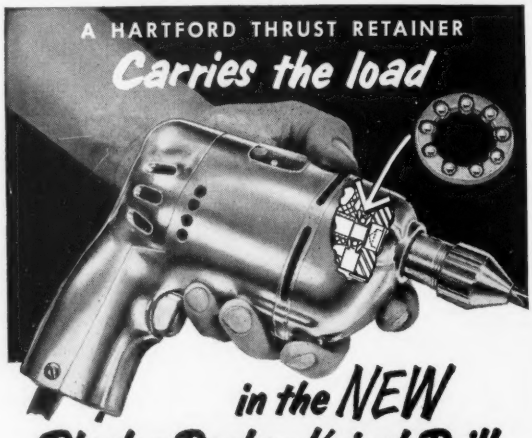

in the NEW

Black & Decker ¼ inch Drill

Over two million home owners own B & D ¼ inch drills — the world's most famous do-it-yourself tool. The new B & D utility drill depends upon a Hartford Ball Retainer to *carry the load.* Every time the operator applies pressure on the drill all thrust is absorbed by the Hartford Thrust Retainer assembly with minimum friction. B & D engineers tell us that the Hartford Thrust Retainer also contributes to smoother, quieter operation and allows for greater overload capacity. If you have a bearing problem why not let *Hartford carry your load?*

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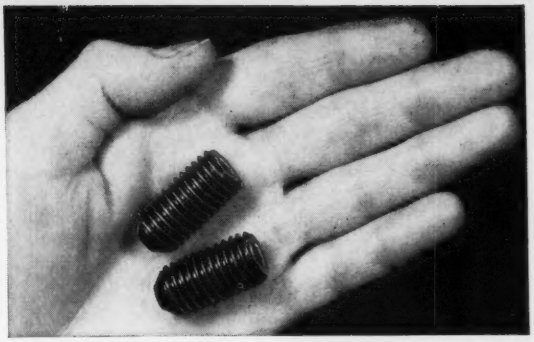

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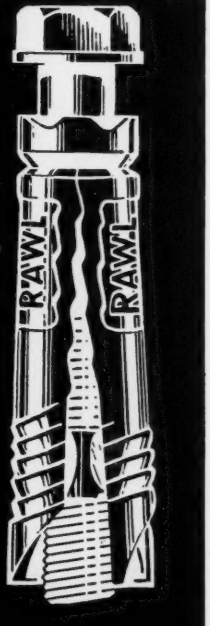

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Fixings with "RAWLBOLTS" are simple, fast and efficient—drill a hole, put the "RAWLBOLT" in, tighten, and the job's done...and stays done too (RAWLBOLT'S" *four* segments assure a uniform, circular grip).

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RAWLPLUG: WORLD'S LARGEST MANUFACTURER OF FASTENING DEVICES

Editorial

The important "Made in Canada" tag

There were two significant facts in a recent address by J. Herbert Smith, president, Canadian General Electric Co.

Speaking of imports, he stated that Canadian industry must take upon itself the risk and responsibility of manufacturing many of the products and components now imported. "Made in Canada" should be a factor in our decision to buy.

One step to this end, has, in fact, already been taken by CGE at Peterborough; within the last few months they have started to manufacture $1 million worth of electrical products previously imported.

Like some other companies (Canadian Westinghouse is one), CGE encourage their people to contribute articles to publications in any field where they are expert. The requirement is, moreover, a specific and written part of the job description of their engineers and professional people. This is done not only because their editorial contributions reflect credit on the company (and on themselves as individuals), but also because the interchange of ideas and information is considered a healthy industrial practice. It helps editors too!

Electronic brain

Electronic brains to "read" the mass of published technical data were recently proposed by Allen Kent and J. W. Perry of the School of Library Science, Western Reserve University, Cleveland.

Industrial concerns needlessly spend thousands of dollars a year on research which they don't know has already been done or in developing devices already patented.

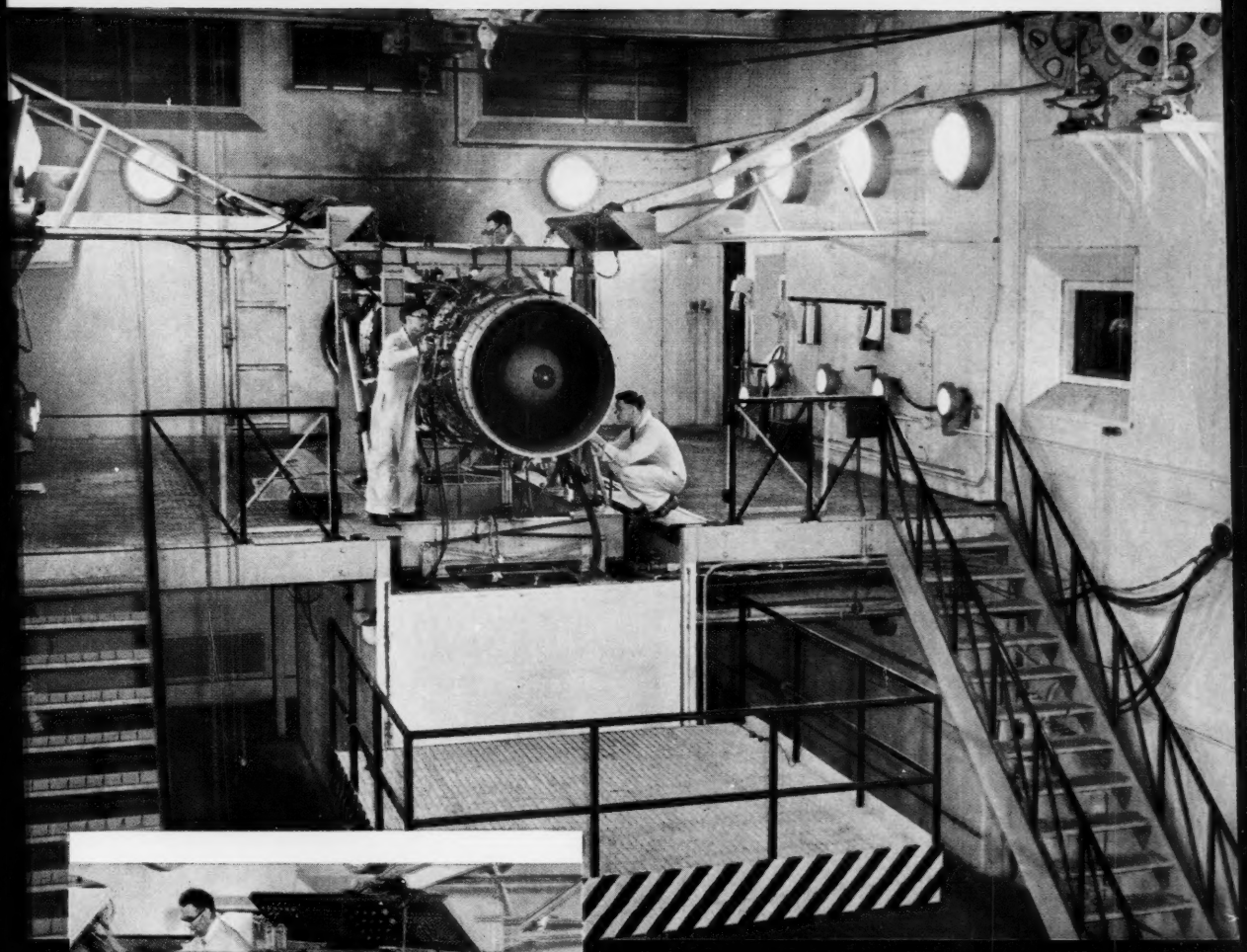
This centralized electronic brain would automatically search abstracts from published technical literature at high speed. Magazines and papers could be sorted and catalogued from many technical angles and easily retrieved.

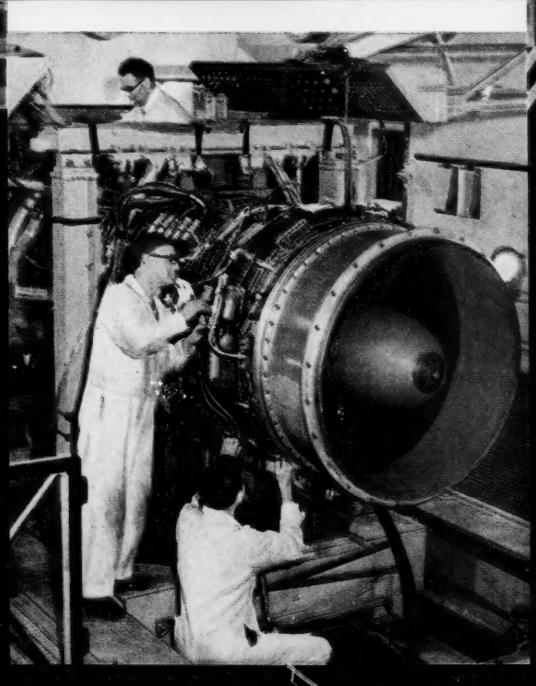
One electronic system is now being pilot-tested with 25,000 important metallurgical papers. Encoded abstracts (in the form of a detailed subject index) are being used as the basis for searching. Making these special abstracts can be done at the same time as an analyst is preparing a conventional abstract for a magazine.

One type of searching service would make it necessary to have a complete file at the central headquarters of, say, an engineering society. Questions sent to the service would be answered on a day-to-day basis. The cost for this service would be $4 or $5 an article, which could be spread over many users.

William Morse.

Rehearsal for Mach 3 at 100,000 feet





IROQUOIS development engines have completed over 5,000 hours of bench running in these test cells at Malton and in flight tests.

Over 100 hours were accumulated during a recent series of test runs at the NACA Lewis Flight Propulsion laboratory, Cleveland, Ohio.

Further tests will be conducted in Orenda's new high altitude facility to investigate IROQUOIS performance over the widest range of speed and altitude.

IROQUOIS test results at NACA Lewis Flight Propulsion laboratory, Cleveland, U.S.A.

1. Probably highest dry thrusts recorded in North America for turbojets.
2. Successful operation under sustained high inlet temperatures.
3. Normal relights up to 60,000 feet, the limit of the tunnel, proved effectiveness of Orenda patented method.
4. Altitude handling improvements incorporated within two months.
5. Thrust/weight 5:1.
6. Thrust—in the 20,000 lb. class (without afterburner).

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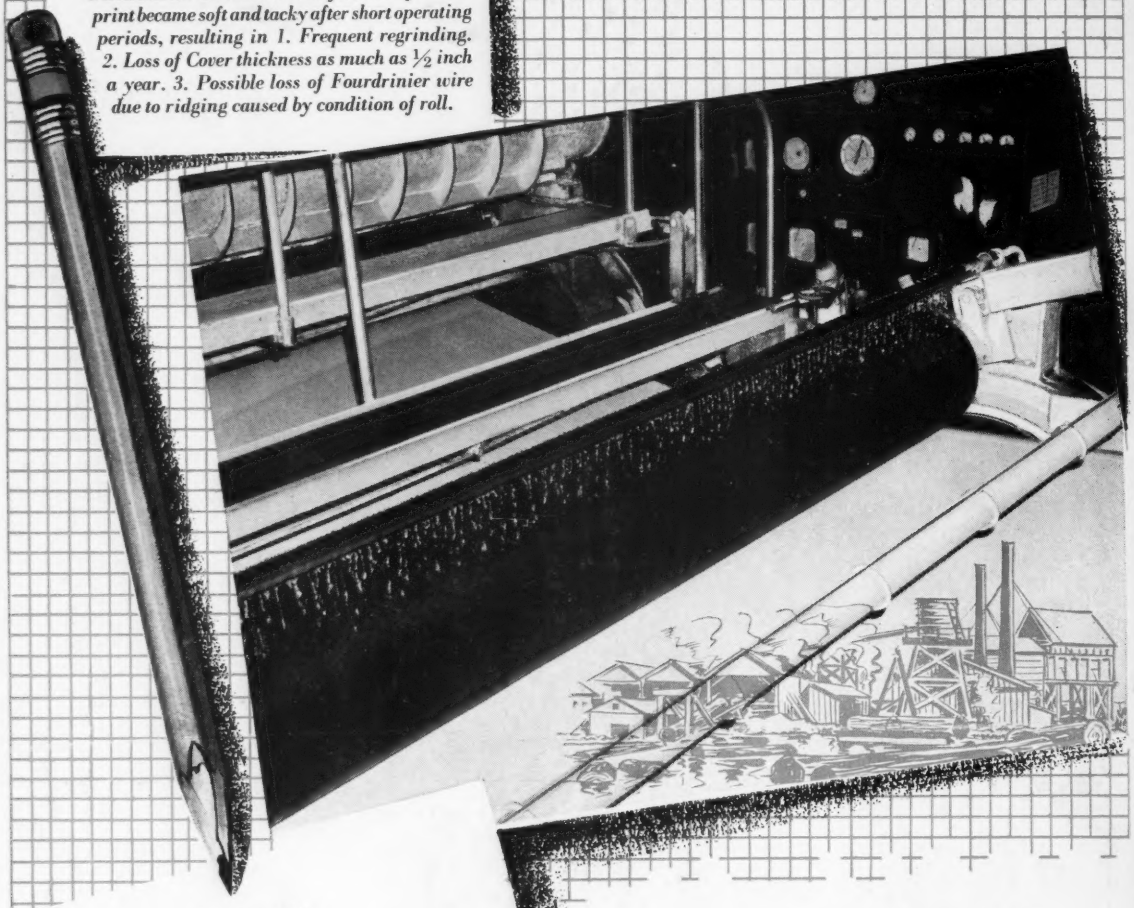
ENGINES LIMITED
MALTON, CANADA

MEMBER: A. V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP

Problem:

Previous covers of Couch Presser Rolls used by a well known Canadian manufacturer of Newsprint became soft and tacky after short operating periods, resulting in 1. Frequent regrinding. 2. Loss of Cover thickness as much as ½ inch a year. 3. Possible loss of Fourdrinier wire due to ridging caused by condition of roll.



Solution:

More than a year ago Dominion Rubber supplied a 1½" cover compounded of Polysar Krynac rubber. The surface of the cover has withstood abrasion, high speed operation and the effects of pitch, wood resins and solvents generally present in newsprint stocks. The use of Polysar Krynac has successfully solved this problem.

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Polysar Krynac is a most highly specialized type of nitrile rubber. Its development was preceded by a need. Now it is one of the family of Polysar rubbers that are serving countless industries.

No matter what your problem, a Polysar rubber may provide a practical and sound solution. Write to our Sales and Technical Service Division, Polymer Corporation Limited, Sarnia, Ontario.

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